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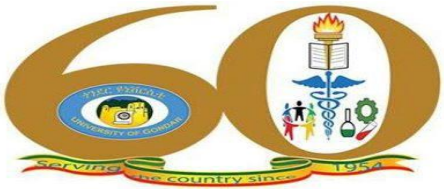

College of Social Science and Humanities

Department of Geography and Environmental Studies

M.A. Thesis on:

Community Based Watershed Development from sustainable livelihood perspective: The case of Aba Gollem and Sommi watersheds in Gondar zuria and Lay Armachiho woreda of North Gondar Zone

By

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June, 2014

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DECLARATION

I, **SAMUEL MULUGETA**, declare that this thesis is my original work and has not been presented for a degree in any other university and that all sources of material used for the thesis have been dully acknowledged.

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This thesis has been submitted for examination with my approval as university Advisor.

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DEDICATION

I dedicate this thesis manuscript to my savior **LORD JESUS**,

My pastors **PASTOR SURAPHAEL AND PASTOR MULUGETA** and to all **UNIQUE 7000 CHURCH COWORKER** for their affection, love and dedicated partnership in the success of my life.

Acknowledgment

Above all I would like to express my gratitude to my Lord- Jesus Christ who carries all my burdens and shepherded me healthy. He gave me strength and patience to withstand the inconveniencies, which I came across through all the processes of education and thesis preparation.

I have received valuable support from many people from the start to the accomplishment of this thesis. So I am very glad to use this opportunity to express my indebtedness to all those who extended me to be energetic and enthusiastic to handle every work that I faced in the process.

My deepest appreciation is to my advisor Dr. krishnaiah Pujari for his valuable comments and criticism from the beginning of the study to its completion. I greatly appreciate his helpful intellectual suggestions, continuous follow up, constructive corrections and patience. I am pleased to thank Ato Eyaya Belay (MA), for his expertise comment on my research GIS part though he is busy in administration and related work.

My sincere gratitude goes to Ato Zelalem Bereket, vice manager of EECME, for his encouragement to work on the issue, Ato Muluken Alemu, Senior officer at EECME office Gondar, for his encouragement and delivery of related reports and other relevant watershed documents, Ato Getamessay Tefera and Solomon Hailu, the CBO committee chairpersons for Aba Gollem and Sommi respectively, for their restless support during my field work.

Also unforgettably, I extend my thanks to all the instructors for their unreserved share of their knowledge during their course delivery which is incorporated in one or the other way in this research work, the secretary W/ro Mulu for her facilitation of office matters and hospitality.

Last but not least, I extend my gratitude to W/ro Yeshi and W/ro Banchi Desalgn for their unreserved effort in typing, editing, duplicating and providing valuable information for the fulfillment of the research work.

Acronyms

AHI: African Highlands Initiative

ANRS: Amhara National Regional State

CBPWD: Community Based Participatory Watershed Development

DFID: Department for International Development

EECME-FSDP: Ethiopian Evangelical Church Mekane Eyasus-Food Security and Development Project.

FAO: Food and Agriculture Organization

HYV: High yielding varieties

ICRISAT: International Crops Research Institute for the Semi-Arid Tropics

IPCC: Intergovernmental Panel on Climate Change

MDG: Millennium Development Goals

MERET: Managing of Environmental Resources to Enable Transitions

NWDPRA: National Watershed Development Project for Rain Fed Areas

PWSD: Participatory watershed development

SL: Sustainable Livelihoods

SRL: Sustainable Rural Livelihood

SUN: Sustainable Utilization of Natural Resources for Food security Program

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Abstract

In recent years, watershed degradation and its impacts on livelihood resource have become a key issue in Ethiopia. The main undesirable impacts on livelihood resources include land degradation, low agricultural productivity and rural poverty, which are interconnected. In order to break these intertwined problems, community based watershed development is practiced. Therefore, the overall objective of this study is to investigate the main challenges and opportunities of community based watershed development with the eye of sustainable rural livelihood perspective in the case of Aba Gollem and Sommi watersheds, community based watershed development project. To meet this objective, 194 HH from the two watersheds were selected by simple random sampling technique (lottery method).Then, through closed and open ended survey questionnaire, responses of sampled household heads were collected. In addition, focus group discussion with watershed committee members and Key informant interview with the development experts at respective watershed level and EECME project focal persons was done. Besides, data were collected through researcher's field observation supported by Photographs. Secondary data were also collected from Agriculture office, EECME Gondar office, as well as from internet. Then, data analysis was done using frequency Tables, pie charts, graphs, percentages and mean for descriptive analysis and an independent t-test for comparing the means in the two watersheds and binary logistics regression model for the status of challenge of CBWSD. The key finding of the thesis presents that the existence of the community based watershed development project in the area with its enabling opportunities, has contributed to diversify their livelihood portfolio. The study reveal that the majority of natural resources have been improved in the watershed because of the IWM practices and its technologies practiced in the area. Livestock development sector, road construction and maintenance, drinking water supply and micro and small scale irrigation in both watersheds have continued at least to some extent and above within the donor support. However, the level of status of continuity, in SWC, forest development and crop production have continued satisfactorily and above rate. Ecological, economical and social responses brought about by the overall implementation CBWSD project in both Aba Gollem and Sommi watersheds and the findings shows that both the ecological, economical and social responses are almost have improved between to some extent and satisfactorily. Economic capital, increased income, diversity of crops to minimize risk, improved productiveness and production and get nutrition food are some of the opportunities gained out of practicing irrigation inside the watershed. However, there were also challenges, because of the investments on activities of employment rate were low, less concern for key activities and appropriate technology, the problem of diversion and maintenance of using irrigation, challenges related to CBOs committee management, institutionalization of watershed development and social network were not given adequate attention in practice and challenging the sustainability of the community-based watershed development. Agricultural activities became an opportunities for viable option of the households, if there were adequate access to irrigation, agricultural inputs & technologies.

Key words: *Sustainability, CBOs, livelihood, CBWSD.*

CHAPTER-ONE

INTRODUCTION

1.1 Back ground

Effective use of land and water is fundamental to growth and sustainable development. The concept of watershed management has evolved to ensure effective use of both natural and social capitals. Thus, the watershed development programs include land, water and human resources as essential components (Joshi et al, 2004). It aims to balance the conservation, regeneration and use by human of land and water resource with in a watershed. Integrating conservation and development activities through community participation and collaboration among different institution and social actor is increasingly recognized as the most promising approach to sustainable natural resource management. Throughout the world, programs and projects inspired by community participation approach are currently being implemented by the United Nations, bilateral cooperation agencies, and nongovernmental organizations (FAO, 2004).

Many countries, particularly those having significant areas with complex, mountains and fragile ecosystem have developed national watershed program or projects (Bharat et al, 2005). The Indian National Watershed Development Project for Rain Fed Areas (NWDPRA) is a major initiative operating in conformity with the common approach for watershed development. China successfully practices the concept of small community based watershed development. The overall plan for the management of small watershed emphasizes on comprehensive erosion control measures (Shamra et al, 2005).

In Africa, focusing on a participatory integrated watershed development program being implemented under the African Highlands Initiative (AHI), an eco-regional program operating in the highlands of Eastern Africa (German, 2003). Most African countries engaged in Watershed development has emerged as a new paradigm for planning, development and management of land, water and biomass resources following a participatory bottom-up approach. Some important ongoing watershed development programs include Drought Prone Area Program, Desert Development Program, International programs and State-funded Watershed Development Programs (Bahri, 2008).

Ethiopia has a history of planning the development of watershed started in 1980s (Geber Hawaria, 2012). A planning unit for developing large watershed comprised 30-40 thousand hectares (Lakew et al, 2005). In line with this participatory watershed development plan at a foundation for sustainable agricultural development in rural areas of Ethiopian in five year growth and transformation plan on natural resource management and climate change. In all areas which require physical soil and water conservation work will be fully implemented through proactive and organized community participation and also conservation based. Watershed focused developmental approach campaign as last year with organized community participation developmental army 20-30 peoples, 1 to 5 work team (Fantahun, 2012).

Amhara National Regional State (ANRS) planned to conduct detailed and resource surveys for the preparation of comprehensive land use and watershed developmental plan in 2009 in three different model watershed areas to facilitate decision making on the allocation of land for different endeavors along with appropriate management recommendation and scaling up. Therefore the land resource survey and planning was intended and conduct at three model watersheds assessed the available challenges and opportunities, so as to put in order of community based watershed development plan as a career (ANRS, 2009). In line with this, in the region community based watershed development has been taken as successful tool for sustainable livelihood. Due to this community based watershed development which has implemented at Aba Gollem and Sommi watersheds in Gondar zuria woreda and lay armachiho woreda (the study area) by EECME food security and development projects (FSDP). Therefore the research intended to investigate challenges and opportunities of community based watershed development at the grass root via the lenses of sustainable livelihood perspective focused on the case of Aba Gollem and Sommi watershed development.

1.2 Statement of the problem

The importance of watershed development programs has been emphasized in the national common programs adopted by the government. These watershed development programs will be taken up on massive scale (Sharma et al, 2005). So it's mandatory that watershed development to be planned implemented and maintained by the watershed communities by theme selves (A.K surivastava, 2005). So that community based watershed development efforts governs water regimes, erosion levels, biomass availability, production levels, the quality infrastructure and

countless other activities to livelihoods (Lakew et al, 2005). In addition to this with the same source it's also noted that community based watershed development is success full tool for sustainable livelihood through income generation opportunities linked to introduction of cash crops, bee keeping, livestock fattening or diary.

However, watershed development has been problematic when applied in a rigid and conventional manner. This is true when applied without community participation and using only hydrological planning unit where arrange of intervention remained limited and post rehabilitation management aspect where neglected such kinds of approach resulted various failures or serious short comings difficult to correct (Perm, 2010).

According to Amhara National Regional State report on 2010, water tables resulting from an intensive watershed treatment where some of the major benefits have been reduced, particularly for the poor because of the competitive use of water resource by rich farmers for irrigation. In addition to this in degraded watershed, opportunities for water harvesting and management are few and limited use, access roads are continuously damaged, access to clean water for domestic use are very difficult and incidence of water born disease is very high.

Why it's in Gondar zuria and Lay armachio woreda in north Gondar zone? Because of its location in the Northern highlands of Ethiopia where agricultural land is becoming tight spot to agricultural based livelihood for all famers and sever natural resource degradation. In the study site, Aba Gollem and Sommi watershed has been detorariated from surplus producing to a food deficit area within a span of twenty years with more land being abounded and productivity is declining to level (ANRS, 2006). On the contrary, there is an intervention of community based watershed development projec its part through generating clear understanding about challenges and opportunities for community based watershed development, which in turn will contributing to improve the livelihood of community or households through comprehensive and integrated natural resource.

1.3 Objectives

1.3.1 General objective

The general objective of this study is to investigate the main challenges and opportunities of community based watershed development from sustainable livelihood perspective in the study area.

1.3.2. Specific objectives

The study is designed to address the following specific objectives:

- To examine the existing livelihood strategies and watershed management practices in the study area.
- To assess the main challenges of community based watershed development.
- To describe the opportunities for community based watershed development.
- To evaluate community based watershed development effect on the ecological, economical and social aspect.

1.4. Research Questions

The study attempts to address the following pertinent question.

- What are the existing livelihood strategies and watershed management practices of communities in the study area?
- What are the main challenges of community based watershed development in the study area?
- What are the opportunities of community based watershed development to enhance sustainable livelihood?
- What are the impacts of community based watershed development brought about in improving the ecological, economical and social attributes of the study community?

1.5. Significance of the Study

Currently sustainable livelihood security is a prime objective of the country and as a result, a lot of effort has been implemented to achieve them (Assefa, 2011).The Aba Gollem and Sommi sustainable watershed development project is one of these parts. Through such intervention project exist; it was not of properly evaluated and documented to draw lessons. Thus this will have significant contribution primarily, to the Aba Gollem and Sommi watershed communities since challenges and opportunities will be identified and so support. Secondly, this study will provide substantial and reliable findings which can be a base of appropriate guiding principles for community based watershed development challenges and opportunities for the locals and stakeholders. Thirdly, the findings of the research would be significant for governmental bodies, policy makers, decision makers, planners, NGOs and other concerned stakeholders.

1.6. Scope of the Study

This study has considered the performance of community based watersheds development project in the case of Aba Gollem and Sommi watershed in Gondar zuria and lay armachio woreda respectively, in North Gondar zone of the Amhara national regional state. the study cover two watersheds, one Sommi and Aba Gollem is from watershed development programs by Ethiopian evangelical church Mekane eyesus for watershed development Project. And also the study focused on the investigation of challenges and opportunities of community based watershed development from sustainable livelihood perspective.

1.7. Limitation of the Study

Even through, Community Based Watershed Development Project of the study area a lot effort has been implemented to achieve it; it's not properly documented with available data in the site. In line with this developing community based watershed development is recent phenomena even in the country as a whole, as the result the researcher faced a limitation on lack of prior studies and absence of well-organized data.

1.8. Organization of the Study

This research paper has organized in five chapters and set in sequence so as to make clears about the concept, issues, ideas which are in circled in the study. The first Chapter, Introductory, part is followed by Chapter two which deals with Literature review on concepts and definition, CBWD as success full tool for sustainable livelihood, gender aspects, definition of sustainable livelihood, CBWD and sustainability linkage, watershed development and sustainable livelihood, potentials and opportunities linked to CBWD, problems encountered with WSD, CBWD project and finally the conceptual frames work of the study. chapter three deals with research methods that include description of the study area, method of data collection, sample size and sampling technique, data sources, data analysis and interpretation, variables and model specification. Chapter four committed to present result and discussion. The last chapter encompasses the conclusion and recommendation.

CHAPTER-TWO

REVIEW OF LITERATURE

2.1. Concepts and Definitions

Some important terms or concepts have been defined to understand the overall contexts of the study. These are essential to explain challenges and opportunities of community based watershed development from sustainable livelihood perspective in the study area.

Community based organization: - It is a broad based development approach that in variably ensures the effectiveness and sustainability of interventions. Empowerment of resource users-how can participatory planning system become the norm institutionally for managing watershed. And it is premised on two very important concepts: (1) Exploring the communities social capital that is, the traditions, culture, values and socially institutionalized forms and making the most of it toward attaining goals, (2) Identifying the core groups that can spearheads the implementation of developmental projects and ensure the sustainability of all development activities(Ritchie, 2004).

Watershed development: - is the integration of appropriate technologies and strategies within the natural boundaries of a watershed for optimum development through conservation, regeneration and judicious utilization of all resources (Li Qianxiang et al, 2005).

Watershed degradation features: -Soil erosion and degradation is a reduction in soil depth and fertility. It is caused by erosion (soil removal, loss of nutrients). Reduced soil water holding capacity and excessive exploitative use of the land. Impoverishments of the vegetative cover; is reduction of the vegetative cover and biomass caused by climatic factors and over utilization of vegetative cover. Erosion and reduced soil fertility, Damage to infrastructure; severs soil erosion and lack of vegetative cover seriously affect the road network and negatively impact on sedimentation rates in water reservoirs and damage to irrigation schemes (Lakew et al, 2005).

Sustainable livelihood: - have been defined by Singh and Titi (1994) as people's capacities to " generate and maintain their means of living, enhance their well-being up on the availability of and accessibility to options which are ecological, socio cultural, economic and political and are predicated on equity, Ownership of resources and participatory decision making.

Community based watershed development: - Involvement of local people is the core of micro watershed based – resources conservation as (utilization and conservation of land , water and vegetation resource) at farmhouse holds and micro – watershed level for continuous improved livelihood and human development (Sharma et al 1997 as cited in Assefa, 2011)

Challenges: - Some persistent factors of community based watershed development that have been facing and may face while protecting developing watersheds to improve the livelihood of community (Eyob, 2012).

Opportunities:- Opportunities for community based watershed development are those good chance for progress linked to water development, diversified crops, access to markets, reclaimed land, fertility improvement, off farm activities, and others (Bouma et al,2006).

Livelihood: - Comprises the capabilities, assets (stores, resources, claim and access) and activities required for a means of living. Livelihood is sustainable which can cope with and recover from stress and shocks, enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation (Chambers and Conway, 1992).

2.2. Community based watershed development: *A successful tool for sustainable livelihood*

The goal of most watershed development projects is to increase agricultural productivity at the micro watershed scale. There are effectively three routes through which the rehabilitation and development of water scarce watersheds is expected to contribute to rural development; increase agricultural productivity, improved natural resource conservation, and more equitable and sustainable management of common property resources (Deshingkar, 2005).

More ever, Community Based Watershed Development is a successful tool for sustainable livelihood through income generation opportunities linked to introduction of cash crops ,bee keeping, livestock fattening or dairy, and others, largely depend on the condition or ”healthy” of the watershed (Lakew et al,2005). In the same source more specific objectives of community Based watershed development include (1) conserving soil, rain water and vegetation effectively for productive users (2) harvest surplus water to create water sources in addition to ground water recharge; (3) promoting sustainable farming and stabilize crop yields by adopting suitable soil, water, nutrient and crop management practices; (4) rehabilitating and reclaim marginal lands through appropriate conservation measures and mix of trees, shrubs and grasses, based on land

potential; (5) enhancing the income of individuals by the diversified agriculture produce and increased employment opportunities(Carucci et al, 2005).Asrat (2005) also pointed out that community based watershed development benefits local household and farmers, the local community, and the society at large discussed on the table.

Table 1: Benefits of community based watershed development at local household, local community and society level.

Benefits to household	Benefits to local community	Benefits of the society at large
- Improved water availability and fertility levels for crop production and diversification. - Improved soil quality and better drainage. - Increased access to biomass for multipurpose use (Fire wood, fodder, fruits, construction) and higher profits. - Increased resilience to shocks and improved livelihoods. - Increased participation in income generation activities.	- Lower land development costs. - Reduced erosion, deforestation, flooding and water logging. - Increased overall agricultural productivity and access to markets and basic services. - Improved livelihood options including for the poorest households. - A more dependable, clean water supply for domestic and industrial use – recharge of acquirers.	- Better conservation of natural resources and biodiversity. - Less danger from floods to downstream farm lands. - Reduced sedimentation of costly irrigation of projects and protection of major infrastructure (e.g. roads) - Increased water supply and improved health. - Reduced occurrence of drought

*(**Source**: Tourton, 2008)*

2.3. Gender aspects and institutional arrangements at the village

Women are estimated to make up about 70% of the world's poor and, thus are likely to be strongly affected by watershed degradation. Vulnerability and adaptive capacity are socially differentiated along the lines of age, ethnicity, class, religion and gender. These are structural difference between men and women through, For example gender specific roles in society, work, and domestic life (Assefa, 2011). In addition to this Lakew et al (2005) also pointed out that women's are the most affected by environmental hardships. Their involvement in watershed development planning, implementation and management is the key to ensure that they equally benefit from the various measures. In line with this watershed development projects should be considered as levers of inclusiveness.

To promote community participation in the watershed for site selection, implementation and assessment of activities, various committees / group were formed (Sharma, et al 2005). Once individuals were able to realize the benefits of soil and water conservation they come forward to participate in other community activities in the watershed by becoming members of various organized groups as follows (in short institutional arrangements at the village level and people participate).

Watershed Association: - All the farmers are members of the watershed association. The association is registered under the registration of societies act.

Watershed Committee: - This is an executive body of the association and is headed by a chair person who is unanimously elected. A secretary, who maintains the records and members representing different sections of the community from the other members of the committee.

Self- help group: - homogenous groups have common identity and interest that are dependent on the watershed area for their livelihood.

Users group: - group of persons most affected by each work and shall include those having landholdings with in the watershed areas

Women self – help groups: -women are empowered to form self-help groups to undertake village level enterprises (Wani, 2005).

2.4. Sustainable livelihood

Earlier, along with soil and water conservation concerns, there was a preoccupation with production goals and targets, with increasing production the overriding goal as characters the green revolution agricultural strategy. There is now increasing attention being paid to issues like (a) how the increase in productivity is brought about, (b) what happens to the biophysical system and processes, and (c)how does it contribute to the quality of life. Terms such as participation, gender, equality, sustainability and livelihoods are now much more prominent (Shah, 1998). The impact of any community based watershed development project on rural livelihood can be accessed from many angles; this study adopts the five capitals framework of the sustainable livelihood approach. These capitals are natural, financial, physical, social and human (Carney, 1998). Sustainable rural livelihoods are critically linked to the enhancement of these five capitals (Scoones, 1998).

Livelihood is the most important concept used in this study. According to chambers and Conway (1992), A livelihood comprises the capabilities, asset's (stores, resources, claim and access), and

activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stress and shocks maintain or enhance its capabilities and assists, while not undermine the natural resource base and provide sustainable livelihood opportunities for the next generation. In line with this, the components of sustainable livelihood (Vulnerability context, assets, mediating institutions, livelihood strategies and livelihood outcomes) are concepts of sustainable livelihood approach for community based watershed development (chambers and Conway, 1992). The details of each asset are discussed.

I. livelihood vulnerability context

Livelihood vulnerability context forms the external environment in which people exist and gain importance through direct impacts up on people's asset status in the watershed. In this study, it comprises trends (i.e. resource trends), shocks (i.e. human, livestock or crop health shocks, natural hazards) and seasonality (i.e. seasonality of prices, products or employment opportunities) and represents the part of the frame work that lies furthest outside stake holder's control. Not all trends and seasonality considered as negative, they can move in favorable directions, too. Trends in new technologies or seasonality of prices had used as opportunities to secure livelihoods.

II. Livelihood Assets

Livelihood assets, the livelihood approach concerned first with people. Therefore, an accurate and realistic understanding of people's strength is crucial to analyses how they endeavor to convert their assets into positive livelihood out comes in the watershed. According to chambers and Conway (1992). The analysis of impact indicators is presented under the five capitals (SRL) frame work along with livelihood strategies.

A. **Human capital: -** Represents the skills, knowledge, ability to labor and good health that together enable people to pursue different livelihood strategies in which the technical aspect focused and achieve their livelihood objectives. As well as being of intrinsic value, human capital is required in order to make use of any of the four other types of assets.
B. **Social capital:-** In the context of sustainable livelihood frame work it's taken to mean the social resources upon which people draw in pursuit of their livelihood objectives

developed through network and connectedness, membership of more formalized groups, relationship of trust, reciprocity and exchanges.

C. **Physical capital: -** It comprises the basic infrastructure, Equipment's, tools, technology and producer goods needed to support livelihoods. The following components of infrastructure are usually essential for sustainable livelihoods, affordable transport; secure shutter adequate water supply and sanitation affordable energy.

D. **Natural Capital: -** Represents the natural resource stocks from which resource flows services (such as land, water , forests, erosion protection, biodiversity degree and rate of change).

E. **Financial Capital: -**It comprises economic activities (income, credit) those were the important availability of cash or equivalent that enables people to adopt different livelihood strategies.

III. Mediating process

Mediating processes are institutions, participation, processes, policies, and that determining access to livelihood assets to pursue livelihood strategies. These developed through formal and informal institutions. In the context of this study, Yalew (2010) stated that formal mediating institutions include the different administrative structure, laws and NGOs. While informal once include Idir (financial and social association used for collaboration in the death of members), Mehaber (mostly practiced in Christian religious followers and has social and economic functions), Senbete (the same with Mahaber but based on some saint days), wonfel (kind of collaborative working practiced for agricultural activities, wedding, harvesting and land preparation.

IV. Livelihood strategies

In the context of the study, livelihood strategies are strategies which communities of the watershed households have experienced to lead the life using either farming or non-farming activities. It is vital to note that the livelihood strategies of the households influenced by different factors Such as social, natural, physical, environmental and economic conditions. This implies that the livelihood strategies of the households are strongly influence by vulnerability context, mediating institution and livelihood assets.

V. Livelihood outcomes

These are the results of combination of different assets using livelihood strategies. It could be positive due to opportunity and negative due to challenges.

VI. Community Based Watershed development and sustainability linkage

The objective of community based watershed development includes economic development of the village community through the optimum use of land, water and vegetation. The success criteria included a set of quantifiable benefits such as increase in ground water and recharging of wells, prevention of soil run off, improvement in soil quality and moisture content, improvement in agriculture production like fodder, fuel, timber, etc. By the late 1990s the issue of sustainability emerged as a major concern in community based watershed development projects following reversals in some successful watersheds, problems encountered in mainstream green revolution agriculture and through debates, encounters and interactions regarding sustainability of natural resources (Abraham et al, 2003). In the same source most watershed developmental guidelines raise the issues of sustainability of ecosystems and methods of production. The concept of sustainability assumes continuity, a time frame and 'staying forever' within the context of the dynamic nature of the society, modes of production and social processes. In addition to this the core focus of watershed development is to maintain the ecological health with in a watershed by controlling the quantity and quality of water.

2.4. Watershed development and sustainable livelihood nexus

Sustainable livelihoods approach suggests that improvement of natural resources through watershed development is not an end itself, but it is a means to an end, "reducing the incidence of rural poverty" (Turton, 2009). Involvement of local people is the core of micro watershed based resource conservation as (Sharma et al, 1997) defined integrated watershed management as; "utilization and conservation of land, water and vegetation resource at farm household and micro watershed level for continuous improved livelihood and human development. The ultimate objective is thus development at the local level through local people at the local levels (Woldeamelak, 2003). NGO implemented projects suggest several positive trends of watershed development on sustainable livelihood; increase in cropping intensity and yields, Reduction in the threat of drought to crop and livestock production, increase in milk production

,recharge of ground water, decline in sedimentation downstream, improves fodder production, year round availability of drinking water, creation of employment opportunity for landless labors (Cathryn, 2009)

Table 2: Sustainable livelihood and watershed development.

Livelihood components	**Key issues**
Capital assets	- Which assets are most important to the poor? - Are there particular combinations of capital asset? - Which increase the likelihood that watershed development will succeed? - Has access by the poor to common property improved as a result of watershed development?
Livelihood strategies	- Does watershed development support the livelihood strategies of the poor? - How does watershed development interface with other livelihood strategies? - How do peoples livelihood strategies affect their participation in and benefit from watershed development?
Sustainable livelihood out comes	- What contribution has watershed development made or sustainable livelihood? - What are the relevant outcome indicators? - Are peoples own livelihood priorities being addressed? - How can activities be adopted in order to enhance livelihood impact on target groups, while remaining consistent with the over objective?

*(**Source**: Cathryn, 2009)*

Recent evidence are emerging from experience of many countries of the world that community based watershed development generally leads to effective resources conservation and improved rural livelihood (Wani and Ramakrishna, 2005).

2.5. Opportunities Linked to community Based watershed development

CBWSD aim to balance the conservation regeneration and use by humans with in a watershed. However, the multiple potentials are Environmental; (For protecting vegetative cover, creating ecological balance, protecting fertile top soil, utilizing the land based on its capabilities, insitu conservation on rain water, increasing ground water potential), Economic (increasing crop intensity, maximizing farm income through dairy, poultry, sheep husbandry, improved and sustained livelihood status of the watershed community with special emphasis on the poor and

women); Institutional (formation of watershed committees and self-help group, establishing sustainable community organization); socials (alleviation of poverty, awareness generation, improving skills of the local community, capacity building, women's participation in decision making process, empowerment of community), equity (To develop equitable distribution of the benefit of the land and water resources development, involvement of communities in participatory planning, implementation, social and environmental arrangement (Prem, 2002).

The potential for CBWD are huge, "bring rural households back to business" in food – insecure and degraded contexts and" keep rural households in business" in other areas. Besides it also enables new opportunities to emerge, linked to water development, diversified crops, access to markets, reclaimed land, fertility improvement, off farm activities (Lakew et al, 2009). In the same source water harvesting opportunities; protection, development and sustainable management of forests; sustained, long lasting and effective use of rural infrastructure (immensely benefit feeder roads and other major road network in fragile and steep terrains); promotion of income generation activates, promote off farm and on farm employment for the poor, and conflict resolution are belongs to community based watershed development in a given watershed projects.

2.6. Problems encountered with watershed development

Watershed development has been problematic when applied in rigged and conventional manner. This true when applied without community participation and using only hydrological planning units, where a range of interventions remained limited and post rehabilitation management aspects were neglected (Carucci et al, 2005). In line with this same source poorly planned watershed approach could result in complete failure. Other cases of failure included upper ridges pointed with monocultures of eucalyptus tree, which depleted water tables and had negative ecological effects on soils. ICRISAT (2003) has reported the lessons learnt from the previous watershed development program studies revealed some of them are as follows: lack of equity in the benefits to small holders and landless, lack of community participation in watersheds, lack of scaling up methods and models, lack of holistic approach in the technical support to most development projects by NGOs. And also major challenges related to CBOS committee management include complain of some committee members for burden of public responsibility at the sacrifice action of their own farming responsibilities (Yeshiwas, 2013).In addition to this

women's involvement in the planning and implementation of soil and water conservation and in managing newly created resources in the watershed is limited. In part, this do not emphasize the importance of beginning the preparation of the watershed plans with an understanding and analysis of women and men's differing use and dependence on both private and common lands, Nor is the dependence for survival of landless and poor women in common land resources recognized.

2.7. Community Based watershed development project

Watershed development program have project objectives; To promote economic development of the village community which directly or indirectly dependent on the watershed; to encourage restoration of ecological balance in the village; special emphasis to improve the economic and social condition of the poor and disadvantage sections of the watershed community (EEMC, 2010) . In line with this the goal of projects in the study area is improving food security status and alleviating poverty of the local community in Aba Gollem and Sommi watershed. The central objective of the project is to conserve and water management, increase Agricultural productivity, food security and biological sustainability and promote afforestation and reforestation. The project activities expected to achieve for the enhancement of livelihoods of the local communities, while combating land degradation, maintaining the hydrological balance conserving the biodiversity and the soil to improve the overall livelihoods of the local community.

2.8. Conceptual frame work

Based on the objective of the research the conceptual frame work has been developed from the literature review to guide the entire work of the study. And also sustainable rural livelihood (SRL) Framework has been used to organize the search for indicators. The analysis of links between livelihoods and watershed development has been widely discussed in recent years (Scones,1998)

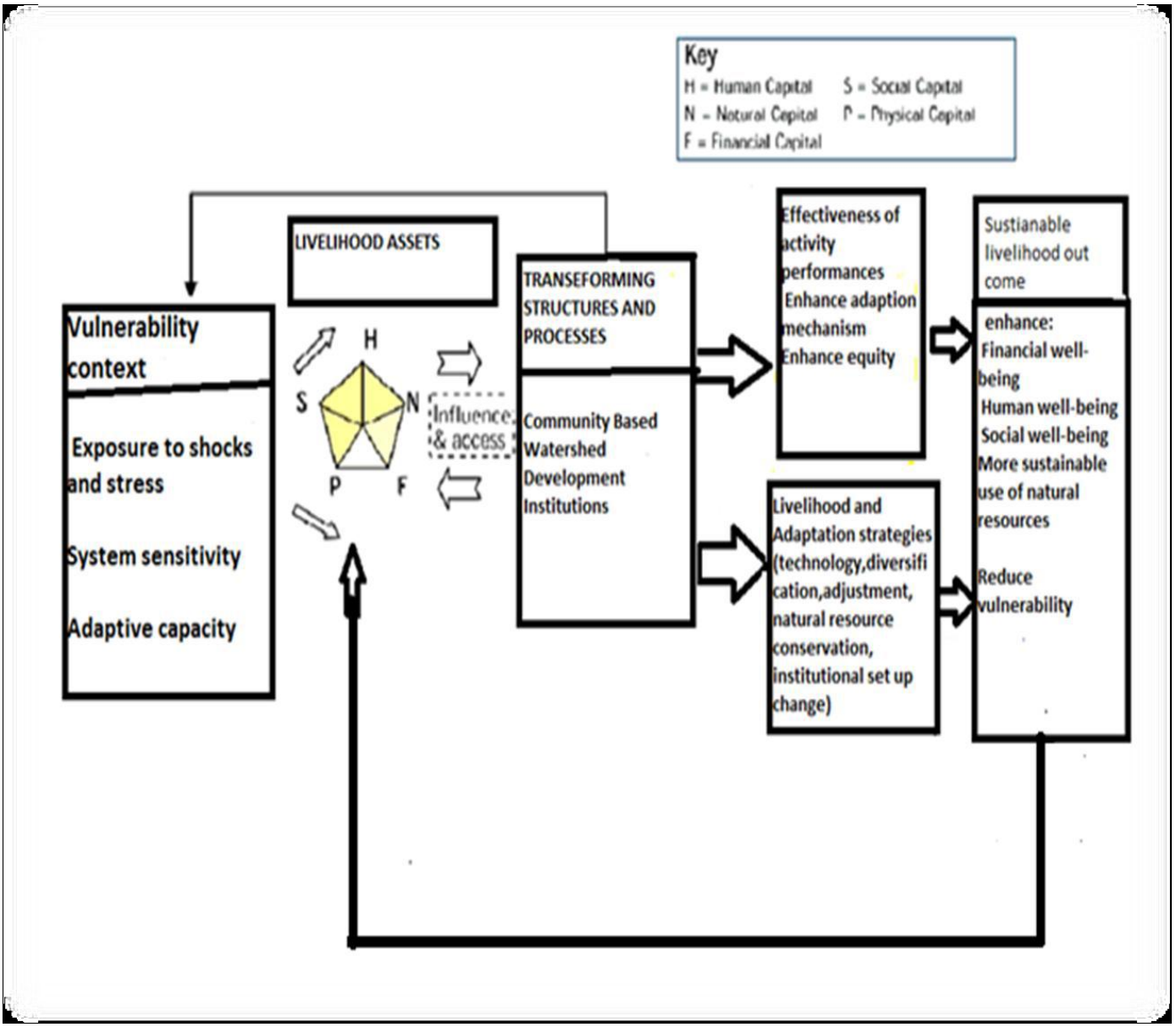

Figure 1: Conceptual Frame Work

Sustainable livelihood and Community based watershed development framework adopted from the DFID sustainable livelihood framework (1999)

CHAPTER-THREE

MATERIALS AND METHODS

3.1. Descriptions of the study areas

3.1.1. Location

Aba Gollem watershed is found in Sabyna Sabiya Keble to the North Eastern part which is 10 kilo meter away from the woreda. Sayna Sabiya is small town serving as an administrator center for Sayna Sabiya kebele and Aba Gollem watershed too. It's a small watershed with about 306hh or 5104 total population among total twelve watershed in the kebele (EECM, 2010) .The watershed is located on the geographic coordinates of 13^0 $94^{'}$ 21" to 14^0 $06^{'}$ 98" North Latitude and 32^0 $93^{'}$ 19" to 33^0 $89^{'}$ 28" East Longitude with watershed total area of 280 hector. Sommi watershed Sommi watershed is located on the way from Gondar to Tikel dingay asphalt road to the east of Gind metaya town with in only about 30 minutes' walk. It is in kerker Bale egzihabehare kebele of layarmachiho woreda. The watershed is a small watershed with only 70hh or about 368 total populations. The watershed has terrain physical landscape (Layarmachiho woreda report, 2010). The watershed is located on the geographic coordinates of 12^0 $40^{'}$ 48" to 12^0 43' 30" North Latitude and 37^0 27'30" to 37^0 29' 32" East Longitude with a watershed total area of 320.5 hectare. (Layarmachiho woreda CBO File, 2012).

3.1.2. Topography

In physiographic terms, both Aba Gollem and Sommi Watershed lie in the North central massif. Hilly landscape and valleys characterize it. Between hills, ridges and fault escarpments are found and physiography of the area is dominantly rugged. River channels, foot slopes consisting moderately steep and undulating slopes, steep cliffs and ridges and plain are units that make the physiography of the research area. Hence, the watersheds are is characterized by 47.07% mountain, 3.12% hills, 30.14% undulating plain, 14.7%streamside slope and 4.97% plain.

3.1.3. Climate

The rainfall pattern of watersheds, as observed at meteorological station, is Unimodal and characterized by single maximum rainfall pattern with peaks in July and August. About80%-90% of the mean annual rainfall falls in the main rainy season ("Kiremt"), which starts in June/July and extends to August/September. Rainfall variability in time is considerably high especially at the beginning and end of the main rainy season. The rainfall records for 51 years shows that the

average annual precipitation at Azezo Airportis about 1163mm. The mean annual temperature ranges from 12.9^{0}C to 26.4^{0}C.

3.1.4. Vegetation and land use

The vegetation consists of evergreen or semi–evergreen 2-3m bushes; bigger bushes, small trees and occasionally larger trees. Large trees are very scattered and limited to cultivated land. The species that occur in the watersheds area include: indigenous species like, Dodoma viscose, Olea Africana, Croton macrostachys, Apodytes dividiata, Carisa edulis,Combretum collinum, Acanthus arobresus and poorly managed state and community plantation forests dominantly: Eucalyptus globules.

3.1.5. Socio-economic features

The Socio-Economic features of the watersheds are not significantly different from over all condition of the districts it is located in. The average family size in a household is 5.52percents making the total population of entire rural setting of the two watersheds which are totally 376 hh (306 hh in Aba Gollem and 70 in Sommi watersheds) (EECM, 2010). The livelihood of most rural community in watersheds is mainly based on mixed farming, that is, cropping and livestock production while some are being engaged in unskilled labor and government works. Despite the high population pressure, the lands are intensively cultivated. All marginal and grazing lands are brought under cultivation. The high population pressure of the watershed has forced to put every piece of land under cultivation.

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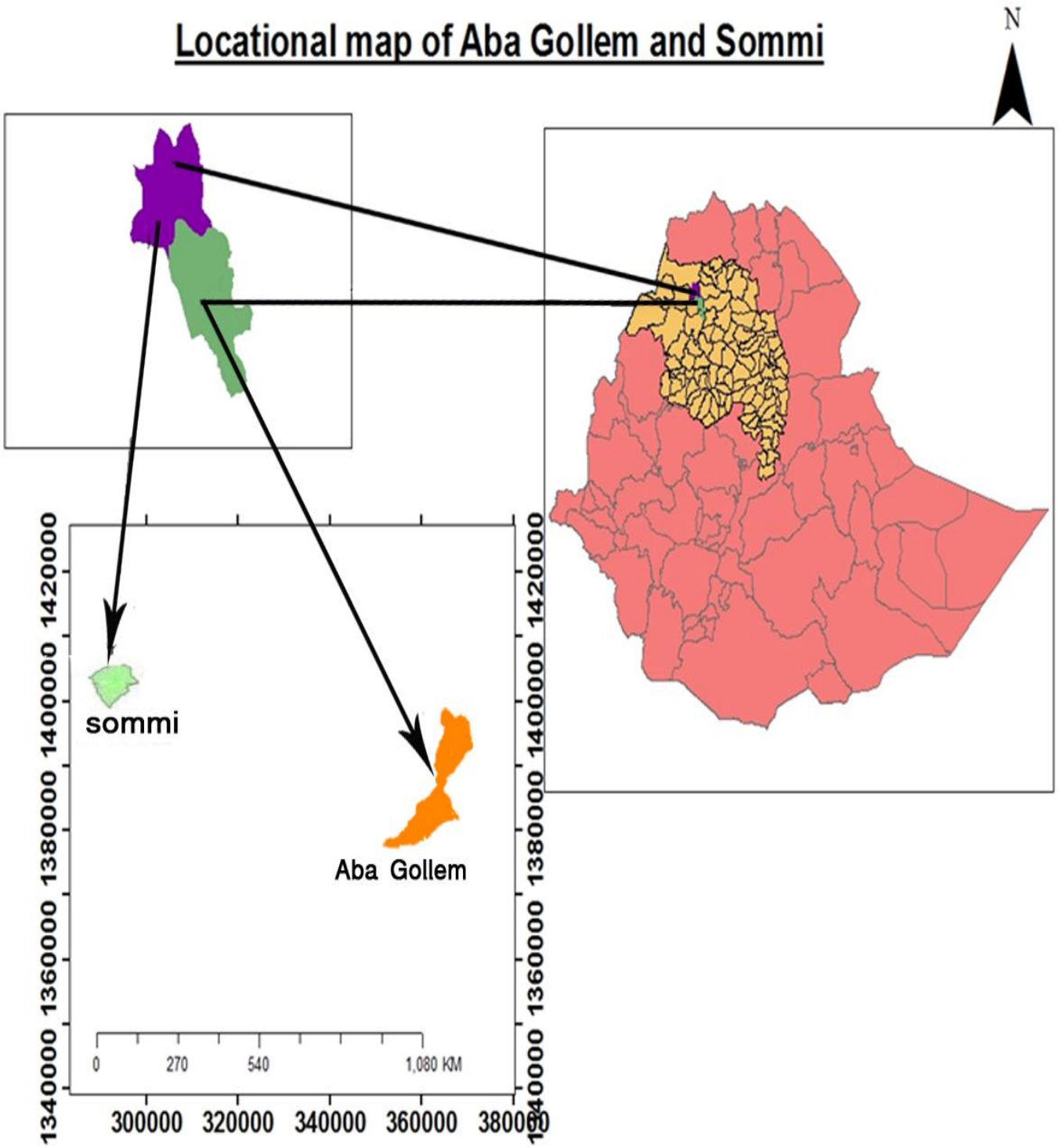


Figure 1 . Location map of Aba Gollem and Sommi watersheds.

(**Source**; own field survey, 2014)

3.2. Research Methods

The objective of this study is to investigate challenges and opportunities of CBWD from sustainable livelihood perspective by taking two case watersheds. For this research therefore, both qualitative and quantitative (mixed design) methods are employed. A qualitative method explores description and understandings of CBWD impact on sustainable livelihood whereas quantitative means use numerical data analysis to classify features to satisfy the objective of the study. The use of mixed research approach thus provides the opportunity to avoid deficiencies and weakness that come from a single approach (Jane et al, 1999).

3.2.1. Method of data collection

Different tools of data collection methods and sources were used and triangulated how, they differ or compatible each process. The main data collection methods used to address the research objective is below.

3.2.1.1. House hold survey

The household survey was employed using the semi structured questionnaires as the major data collection process of the study. The questionnaires involved both open and closed ended questions. It is prepared in English and translated into Amharic which is the local language of the study area. The data was collected by enumerator in which they were given training before data collection is commenced.

3.2.1.2. Focus group discussion

Focus group discussion had been carried out within the watershed users association at Kebele level in each watershed (Aba Gollem and Sommi). It will comprise 8-10 and 6-8 individuals, respectively. The main objective of this method is to triangulate the survey method and investigate additional facts that might not be addressed by the survey method.

3.2.1.3. Key informant interview

Key informant interview had been conducted with different individual at different level. There were ten different individuals at Kebele and Woreda level in each watershed. One chairperson of the watershed committee and one women and children affair offices in each watershed Kebele. In addition, at the woreda level one expert who was assigned as a project focal person and agricultural and rural development expert who was assigned as natural resource conservation expert were used as key informant discussants.

3.2.1.4. Observation and photograph

To understand the overall status of CBWSD and pictures of the study site, this technique had clear and practical understanding. Bio physical conditions ,soil and water conservation works, forest development/vegetation cover, forage and agroforestry situation, micro and small scale irrigation and project works on watershed that have been implemented by the local communities was addressed by this method.

3.2.2. Sample size and sampling technique

The two study watersheds (Aba Gollem and Sommi watershed) are purposively selected due to the reason that these two watersheds are among the programs of community based watershed development projects in Amhara national regional state. Then, at watershed level, the target population is the entire rural setting of the two watersheds which are totally 376 hh (306 hh in Aba Gollem and 70 in Sommi watersheds) (EECM, 2010). And to develop the total sample size, proportionally sampling method was used as shown below. Formula to calculate sample, size as adopted by Yemane (1967):

$$n = \frac{N}{1+N\,(e)\,2} \quad \text{---------- (1)}$$

Where n = the number of required sample of HHs (sample size)

N= Total household of the two watershed (population size)

E= Confidence level (level of precision)

The required sample house hold of each watershed (n) can be therefore, calculating using the following formula:

$$n1 = \frac{N1\,(n)}{\sum N} \text{ ---------- (2)}$$

Where: ΣN= total households of the two watersheds Therefore to find the sample size from the total 596 hh, we will use.

$$n = \frac{N}{1+N\,(e)\,2} = \frac{376}{1+376\,(0.05)\,2} = \frac{376}{1.94} = 194HH$$

$$\text{And } n1 = \frac{306\,(194)}{376} = 158 \text{ HH and } \quad n2 = \frac{70\,(194)}{376} = 36HH$$

Therefore, from the total 396 hh, 194 was selected using simple random sampling (lottery) technique of which as per the formula finding above 158 hh were taken from Aba Gollem watershed and 36 hh from Sommi watershed.

3.2.3. Data sources

The data for this study were generated from both secondary and primary Sources of data focusing on both qualitative and quantitative natures.

a. Primary sources: - the primary sources of the thematic issues were focused on community based watershed development for sustainable livelihood; challenges and opportunities of community based watershed development. Data's were collected from sample household heads in both Aba Gollem and Sommi using questionnaires, observation and photograph, Focus group discussion, key information interview and document review.
b. Secondary sources: - Secondary data's were collected from different sources including books, research journals, internet sources and reports from agricultural and rural development office, Ethiopian evangelical church mekane eyesus on watershed development ,Tana beles integrated water resource management and sun – program (Sustainable utilization of natural resources for food security), and CBO file were used.

3.2.4. Data Analysis and interpretation

Data analysis and interpretation are fundamental components of the surveillance process. Therefore, the collected data were systematically analyzed and interpreted using mixed approach. Data gathered using predominantly qualitative variables is subject to phenomena description and narration since data from key informant interview, focus group discussion and direct observation are largely qualitative, the interpretation involved a triangulation of different views from varied sources. Thus, qualitative data which was obtained from observation and photograph check list and key informant interview was organized and analyzed based on systematic grouping and content of analysis to describe phenomena into their respective thematic areas. Whereas, the data from questionnaires was processed in statically package for social scientists (SPSS version 20) software. The quantitative data was analyzed using descriptive statistics. Descriptive statistics such as percentage, frequency of occurrence and mean were employed. Interpretation of analyzed data was made on the basis of outputs from SPSS and with careful cross – checking of the finding from focus group discussion, key information interview and observation and photograph data. At the end, appropriate inferential statistics technique was used to undertaken inferential analysis. These techniques were the independent sample t-test which helped to compare means by watershed in order to understand which component of IWM practices has been continued and which are not and whether there is a difference by watershed in the level of continuity of the components of IWM .Secondly, binary logistics regression model was used to check the independent variables (variables expected to influence challenge and opportunities status) with dependent variable.

3.2.5. Variables Definition

After having and explaining the appropriate analytical tools it is reasonable to identify and describe the dependent and independent variables.

The Dependent Variables of the Study: A dependent variable is a variable that is said to be affected or explained by another variable/ variables. The dependent variable for the study is the challenge and opportunity status of the community based watershed development project.

The Independent Variables of the Study: The independent variables that were expected to influence the challenge and opportunity status are portrayed below.

- Age of household head
- Access to credit
- Sex of the Household
- Access to market
- Family Size
- Access to Agricultural inputs
- Marital status
- Average income
- Educational level
- Average expenditure
- Farm experience
- WS community membership

3.2.5. Model Specification

To analyze the quantitative data for this study binary logistics regression model was used because this technique is appropriate when, the main objective in using this technique is to investigate the status of the dependent variable (challenge and opportunity) based on its covariance with all the independent variables. The model can have an arbitrary number of parameters and terms in the model representing qualitative variables, quantitative variables, and interaction terms in order to model categorical outcome variable. And also it is useful first is from a mathematical point of view, it is an extremely flexible and easily used function, and the second is that it leads itself to meaningful interpretation.

CHAPTER - FOUR

RESULTS AND DISSCUSIONS

This chapter presents results of the study and discusses the result based on objectives. The chapter is divided into eight sections and explain based on findings of descriptive analysis (section 1-7) and inferential analysis model (section 8). Accordingly, section one presents socio – economic characteristics of the sampled household heads. In section two, the result on the analysis on status of existing watershed management activities. This part is further supplemented and triangulated using photographs and data obtained from field observation, focus group discussion and key informant interviews. Section three presents the analysis and results of the vulnerability context. The fourth section presents a brief description of livelihood assets and capabilities (Status, Challenges and opportunities).Section five presents institution and participation in the watershed. Section six presents results and analysis of the basic livelihood strategies. The last section of descriptive part presents outcomes that CBWSD project brought about in improving the ecological, economical and social attributes of the study community on sustainable livelihood. The last section presents and discusses the results of the independent sample t-test and the binary logistics regression model with the aim to infer about challenge and opportunity level which may then open road for conclusion and recommendations which is to be addressed in the next chapter.

4.1. Descriptive Analysis

4.1.1. Demographic and socio – economic characteristics

Table 4.1. Demographic and socio – economic characteristics of sample household heads based on age, Household size , farm experience, size of land holding, income and expenditure.

Types of Respondents Household characteristics	Aba Gollem	Sommi	Total
	Mean	Mean	Mean
Age of House hold	50	47	48.5
House hold size	6	5	5.5
Farm Experience	29	26	27.5
Size of land holding	1	1	1
Average monthly income	1032.15	979.17	1005.66
Average Monthly expenditure	911.58	861.67	886.625

***Source**: - Own field Survey, 2014*

Table 4.1. Presents demographic and socio- economic characteristics of the sample house hold heads. Such as Age, HH size, farm experience, size of land holding, Average monthly income and expenditure. Accordingly the mean age of the sample households are 48.5 years old in Aba Gollem and Sommi watersheds. This indicates that most of the sample households heads are adult farmers which are within active age farming experience.

Similarly, Table 4.1 clearly indicates that the Average household size including the house hold head is 6 and 5 for Aba Gollem and Sommi watershed respectively. The reason why the total is similar with the case of Aba Gollem is simply due to the influence of the sample size.

When it comes to the farm experience of the sampled housed hold heads, table 4.1 indicates that those from Aba Gollem have an average farm experience of 29 years where as those from Sommi have an average farm experience 26 years. The data explains that sample house hold heads taken from Aba Gollem watershed has more farm experience than sampled house hold heads taken from Sommi watershed.

Table 4.1, together makes clear the sizes of land holding of the sampled household heads are nearly the same in all cases that is 1 hector.

Lastly, Table 4.1 Presents the average monthly income versus average monthly expenditure of the sample house hold heads. Consequently , the average monthly income of the sampled household heads when the total 194 samples are considered is Ethiopia Birr 1006.00 and the average monthly expenditure is Ethiopia birr 887.00. When the Average monthly income and average monthly expenditure is seen at watershed level, it is Ethiopia birr 1032 and Ethiopia birr 912 in Aba Gollem watershed and it is Ethiopia birr 979 and Ethiopia birr 816 in Sommi watershed respectively. This data reveals that incomes are greater than expenditure at all cases which is a positive sign of self-sufficiency, it seems they are not aid dependent. However, as farmers are reluctant at disclosing the amount of their exact income and expenditure from the point of both socio – cultural influence and technical limitations and so the presented income or expenditure amount of Ethiopia birr may deviate from reality, the fact that most agree on the point that expenditure is less than income is a healthy sign of income expenditure analysis. From field observation there was health sign of economy, in Saynna Sabya market. The researcher observed enough quantity of grains, livestock sales, and full population crowded with better commodity exchange which may indicate that there is relatively a healthy economic system. In

Sommi too, farmers through Gondar fasil milk association are delivering milk products to Gondar city.

Table 4.1. Demographic and socio – economic characteristics of sample household heads based on age, Household size , farm experience, size of land holding, income and expenditure.

Types of characteristics		Aba Gollem		Sommi		Total	
		Freq.	Per.	Freq.	Per.	Freq.	Per.
Sex	Male	109	69	12	33	129	66.5
	Female	49	31	16	67	65	33.5
	Total	158	100%	36	100%	194	100%
Education level	Illiterate	52	32.9	18	33.4	70	36.1
	Read and Write	75	47.5	12	50	87	44.8
	Primary school	24	15.19	6	16.6	30	15.5
	Secondary School & above	7	4.41	0	0	7	3.6
	Total	158	100%	36	100%	194	100%
Marital status	Single	6	3.8	0	0	6	3.1
	Married	103	65.2	21	58.4	124	63.9
	Divorced	24	15.1	8	22.2	32	16.5
	Widowed	25	15.9	7	19.4	32	16.5
	Total	158	100%	36	100%	194	100%

Aba Gollem = 158 and Sommi =36 Total =194

Source: *- Own field Survey, 2014*

Table 4.2 reveal that out of the total 194 sample house hold heads 66.5% were male headed household where as 33.5% of the sampled respondents were female headed and at watershed level, male constitutes 66.5% and female constitute 33.5% of the 158 sample house hold heads in Aba Gollem watershed and male constitute 69% and female constitute 67% of the 36 sample household heads in Sommi watershed. This data shows more males than females are considered in the study and this is because, as socio – culturally known, house hold heads are mostly males. In addition from the same table, 63.9% of the total 194 sample household heads were married while 3.1%, 16.5%, 16.5% were single, divorced and widowed respectively.

As to their educational level, it is also evident from Table 4.2 that 32.9% , 47.5%, 15.19% and 4.41% have an educational level of illiterate, read and write, primary education and secondary and above in Aba Gollem and 33.4%, 50% , 16.6% have an educational level of illiterate, read and write and primary education in Sommi respectively. As known both of them

are at similar standards in terms of their educational level. In total, out of l94 sample house hold heads, most of them (44.8%) are read and write and greater proportion of the remaining (36.1%) are illiterate. Therefore, most of the study watersheds population are read and write with considerable proportion of illiterate level.

This data at watershed level shows that Aba Gollem 65.2%, 3.8%, 15.1% and 15.9% are married, single, divorced and widowed respectively out of 158 sample households, where as in Sommi watershed 58.4%, 22.2% and19.4% are married, divorced and widowed respectively out of the 36 sample house hold heads. Therefore we can infer most of the participants in this research study are Married house hold heads.

4.1.2. Status of Existing Integrated watershed management activities

This part of the descriptive analysis presents the status of integrated watershed management activities in the study areas of Aba Gollem watershed in Sayna sabiya kebele of Gondar Zuria woreda and Sommi watershed of Chira kebele of lay armachiho woreda in North Gondar Zone which is under EECME project support. Status of existing integrated watershed management activity means the status and continuity of the major activities of integrated watershed management practices which had been implemented during the period of donor support. The major intervention types are those given in Table 4.3. Then respondents were approached for their views at an ordinal scale of No role at all, have role to some extent, have role satisfactory and have role strongly in facilitating or managing activities. The survey response is then summarized in a descriptive analysis under discussion of each type of intervention below for ease of analysis.

Table 4.3 Rating of status of IWM activities by type of intervention.

Types of intervention / sector	Aba Gollem	Sommi	Total
	Mean	Mean	Mean
Soil and water conservation works	3.19	3.5	3.39
Forest development	3.13	3.19	3.16
Crop production	3.27	3.42	3.35
Livestock development	2.53	2.67	2.60
Road construction and maintenance	2.76	2.72	2.74
Micro and small scale irrigation	2.83	2.94	2.87
Drinking water supply	2.72	2.76	2.74

Note: 1 = Not at all, 2 = to some extent, 3= satisfactorily, 4= strongly

Aba Gollem = 158 and Sommi =36 Total =194

***Source**: Own field survey, 2014.*

Note: - The Average mean is the mean of the means of specific activities. E.g. the mean of SWC is the mean of the different activates under SWC works such as gully treatment, stone bund, micro basin, etc. In the questionnaire, respondents were asked as to the status and continuity of each specific activities of a given component of IWM activities at a rate of 1 = activity not continued at all, 2 = specific activities continued to some extent, 3 = satisfactory and 4= strongly and the means were calculated per each specific activity.

In Table 4.3 shown that SWC, forest development and crop production sector have a status and continuity to satisfactory (Average mean 3.39, 3.16 and 3.35). The rest interventions or sectors also indicate that major integrated watershed management activities have been continued to some extent and above. Table 4.3 also reveals that some key activities integrated watershed management activity such as livestock development, Road construction and maintenance, Micro and small scale irrigation and drinking water supply in both Aba Gollem and Sommi Watersheds have continued at a level of to some extent and above. On Sommi side except Road construction and maintenance have continued better than the case in Aba Gollem.

4.1.2.1. Status of continuity of soil and water conservation activity.

As known, SWC works are key component of IWM. This is because conserving soil and water resources are bases for other types of IWM program interventions.

Table 4.4 Status of soil and water conservation practices

Types of IWM activities	Aba Gollem	Sommi	Total
	Mean	Mean	Mean
Soil and water Practices	3.19	3.5	3.39
• Stone bund	3.86	3.82	3.84
• Plantation on bund	3.5	3.7	3.59
• Hill side terrace	2.54	2.66	2.60
• Micro basin	2.41	2.55	2.49
• Gully rehabilitation	2.17	2.21	2.19

Note: - 1 = Not at all, 2 = to some extent, 3= satisfactorily,4= strongly

Aba Gollem = 158 and Sommi =36 Total =194

***Source**: own field survey, 2014*

Intervention in field crop production, vegetables or fruit production, small scale irrigation practices, forestry and livestock development as well as drinking water supply activities etc. are all depend on conserved soil and water resources within the watershed. Rehabilitating the

degraded lands to its fertile standard is largely achieved also through implementing different effective soil and water conservation.

Table 4.4 Shows that stone bund, Plantation on bunds, Hill side terrace, micro basin and gully treatment have status and continued on average at 3.19 , 3.86, 3.5, 3.54, 3,45, and 3.17 in Aba Gollem and at 3.5, 3.82, 3.7, 3.66, 3.55, 3.21 in Sommi watershed. This shows that SWC are above satisfactory level in Aba Gollem watershed. Where as in the case of Sommi SWC practices are better than in Aba Gollem and rated between satisfactory and strongly. More ever, the focus group discussion and key informant interview in both watershed supports the survey finding. They all agree that the role of CBO, in soil and water conservation component of IWM practices is better. This may be also due to the influence of project intervention and government focus attention on the issue. Besides, researcher's field observation supported by the photographs bellow also indicates that activities of soil and water conservation are indeed continued remarkably in both watersheds better than other types of interventions. However, there are some SWC works that need maintenance (Photo4.1).

Photo 4. 2. Stone bund, Aba Gollem (Left) and Stone bund and water way construction along gully, Sommi (Right)

*(**Source**: Field survey, 2014).*

4.1.2.2. Status of continuity of forest development components of IWM activity.

Table 4.5. Status of forest development practices

Types of IWM activities	Aba Gollem	Sommi	Total
	Mean	Mean	Mean
Forest development	3.13	3.19	3.16
• Individual tree seedlings nursing	3.17	3.17	3.17
• Tree seedlings plantation	3.40	3.16	3.10
• Wood lot	3.19	3.23	3.21

Note: 1 = Note at all, 2 = to some extent , 3= Satisfactory, 4= strongly

Aba Gollem = 158 and Sommi =36 Total=194

***Source**: Own field survey, 2014*

Table 4.5 Indicates that on average the continuity of forest development in Aba Gollem is to the level of satisfactory and above , where as in Sommi is 3.19 which is bit greater than . when seen in detail Table 4.5 Shows that the activities considered in this study under forestry development shows 3.17, 3.40, 3.19, in Aba Gollem and 3.17, 3.16, 3.23 in Sommi respectively. This indicates that the level of continuity in Sommi is better than that of Aba Gollem. And when seen in specific activity level, wood lot is less than others in Aba Gollem watershed. Researchers field observation also support it (Photo4.2)

Photo 4.2.Bukaya Sheleko plantation in Aba Gollem (right) and Individual nursery, Sommi (left) *(**Source**: Field survey, 2014).*

4.1.2.3. Status of continuity of crop production component of IWM activity

One of the major components of community based watershed development project is intervention in Crop production practices. As known, food security within the watershed community will be achieved if there is improvement in crop production component of CBWSD. That is why EECME had included this intervention in watershed development.

Table 4.6 Status of continuity of crop production.

Types of IWM activities	Aba Gollem	Sommi	Total
	Mean	Mean	Mean
Crop Production	3.27	3.42	3.35
• Increase in main crops productivity	3.47	3.49	3.48
• Increase in vegetables and fruit production	3.33	3.45	3.39
• Increase in inputs (improved seed and fertilizer	3.27	3.29	3.28

Note: - 1 = Not at all, 2 = to some extent, 3= satisfactorily, 4= strongly

Aba Gollem = 158 and Sommi =36 Total=194

***Source**: Own field survey, 2014.*

The data therefore shows that increase in main crop production is bit greater than vegetables and fruit production in both watersheds. Particularly, vegetables and fruits production has improved and this was also supported by focus group discussion, key informant interview and from researchers own field observation and the main reason for such improvement was found to be increased amount of water from springs and hand dug well down of the area closure sites and the increasing trend of farmers to use these sources through small scale irrigation practices for vegetables and fruit production .

4.1.2.4. Status of continuity of livestock production components of IWM activity

It is clearly understood that in rural community livestock development sector plays key role in the fulfillment of food security as a means of asset building and sign of status of wealth among rural community. In the study watershed, it was observed that the grazing system is surprisingly changed from free grazing system into cut and carry system after establishment of area closure sites and possibility of grass provisions to beneficiaries, which is an interesting outcome of the involved project. Ato Mulkuken, focal person of EECME from Gondar office has mentioned in his key informant interview that farmers from Sommi and Aba Gollem watersheds are shifted towards managing small number but high breed type of livestock management and are part of Gondar Fasil milk and earns income.

Table 4.7 .Status of continuity of livestock production

Types of IWM activities	Aba Gollem	Sommi	Total
	Mean	Mean	Mean
Livestock Production	2.91	3.27	3.09
• Introduction of improved animal breed (poultry, sheep , cattle)	2.87	3.03	2.95
• In kind revolving loan of livestock	2.93	3.15	3.04
• Improve bee keeping	3.17	3.19	3.18

Note: - 1 = Not at all, 2 = to some extent, 3= Satisfactory , 4= strongly

***Source**: Own field survey, 2014*

As per the FGD in Aba Gollem, the reason for low status of continuity in Aba Gollem (Compared with Sommi) are two; the first is that the watershed users association committee could not able to revolve in kind loans of livestock secondly, due to miss understanding about the grass management from the area closure sites in Aba Gollem and Bukaya shelleko mountain. The Analysis Table 4.7 above, the performance of livestock development in Sommi is satisfactory and above but that of Aba Gollem is about to some extent and this information is supported by the researchers field observation (Photo4.3)

Photo 4.3. Sheep under management, Aba Gollem (left), and poultry with improved cage, Sommi (Right)

(***Source**: EECME, 2012).*

4.1.2.5. Status of continuity of rural road construction

As part of community based watershed development project, rural road construction and maintenance have been practiced and continuing on average at a level of 2.72 in Aba Gollem watershed and 2.76 in Sommi watershed (Table 4.8). Table 4.8 and give as 2.89 and 2.51 in Aba Gollem and 2.95 and 2.61 in Sommi watershed respectively indicating that activity is better status in Sommi than Aba Gollem.

Table 4.8 Status of continuity of rural road construction

Types of IWM activities	Aba Gollem	Sommi	Total
	Mean	Mean	Mean
Road Construction and maintenance	2.72	2.76	2.74
• New rural road construction	2.89	2.95	2.92
• Maintenance of existing rural roads	2.51	2.61	2.56

Note: 1 = Not at all, 2 = Satisfactory, 3= to some extent, 4= strongly

***Source**: Own field survey, 2014*

The FGD and KII are also supported the status of at the level of about to some extent which is similar to the above result .However, there are needs of further maintenance particularly in Aba Gollem watershed.

4.1.2.6. Status of continuity of drinking water supply

Drinking water supply is among the important intervention of integrated watershed management program and the level were also assessed in the table. Table 4.9 shows that on average drinking water supply have continued 2.72 in Aba Gollem and 2.76 at Sommi

Table 4.9 status of continuity of drinking water supply

Types of IWM activities	Aba Gollem	Sommi	Total
	Mean	Mean	Mean
Drinking water supply	2.72	2.76	2.74
• Spring water development	2.76	3.12	2.94
• Hand dug well development	2.55	2.63	2.59
• Spring water protection and maintenance roads	2.91	3.07	2.99
• Hand dug well protection and maintenance	2.89	2.97	2.93

Note: - 1 = Not at all, 2 = to some extent, 3= Satisfactory , 4= strongly

***Source:** Own field survey, 2014*

The data show that status of continuity in Aba Gollom seems low from the survey analysis, However, in case of Sommi, there is improvement because there are efforts of hand dug well

and spring water development at village level here and there to satisfy drinking water supply service.

4.1.2.7. Status of continuity of micro and small scale irrigation

An integrated soil and water conservation works at upper catchment allows the chance to increase water amount and water sources in the downstream catchments in addition to reduced damage due to flooding. This is because available rain will get chance to infiltrate at the upper catchments and get stored instead of flow down as run- off. As a result there will be increased micro and small scale irrigation practice at the immediate down catchment with in the same watershed. This phenomenon has achieved successfully in both Aba Gollem and Sommi watersheds as per the household survey finding, FGD, KII and researchers own observation. Table 4.10 reveals that micro and small scale irrigation practices have continued on average at a level 2.83 in Aba Gollem and 2.94 in Sommi watershed respectively indicating that there is better status of continuity of micro and small scale irrigation.

Table 4.10 status of continuity of micro and small scale irrigation

Types of IWM activities	Aba Gollem	Sommi	Total
	Mean	Mean	Mean
Micro and small scale irrigation	2.83	2.94	2.87
• Irrigation canal construction and maintenance	2.99	3.05	3.02
• Diversion water for irrigation	2.18	2.26	2.23
• Use of pumps for irrigation	2.88	2.96	2.92
• Plantation of grass on irrigation canals	2.99	2.85	2.82

Note: - 1 = Not at all, 2= to some extent, 3= Satisfactory , 4= strongly

Source: *Own field survey, 2014*

Similar to other components, detail activities considered in this components are given in table above and have included irrigation canal construction and maintenance, diversion of water for irrigation, use of pumps for irrigation and plantation of grass on irrigation canals and these activities have continued on average at a level of 2.99, 2.18, 2.88 and 2.79 in Aba Gollem and 3.05, 2.26, 2.96 and 2.85 in Sommi respectively. The detailed data indicates that irrigation cannal construction and maintenance followed by use of pumps for irrigation in Sommi watershed has better continued. In both watershed the level of irrigation canal construction and maintenance has satisfactory with on average of 3.02 mean.

4.1.3. Vulnerability context (Shocks, Stress, Seasonality and watershed degradation)

Households are vulnerable to different kinds of problems, shocks, stresses, and changing trends. Based on the data obtained from different sources, the context of house hold is discussed in the following sub – sections. The information gathered from FGD, KII and reports of the kebele revealed that the main vulnerability factors of the watershed community before intervention were multiple. These were frequent occurrence of drought, erratic and uneven rainfall distribution, poverty, low technology adoption, land scarcity, land degradation, low crop productivity, livestock disease, shortage of fodder and pasture, lack of motivation of the community to get rid of from poverty are some to be mentioned. According to their justification, all these resulted low productivity and production for the study area. Some of these challenges still exist and some are reported to be reduced due to the intervention. Among persistent factors depletion of water tables, erratic rain fall, unemployment and crop pest still exist. However natural resource degradation, low harvest, low access of credit, low involvement of institution has been reduced. Pertinent to this, the result of survey data shows that out of 194 more than half of them (54.1%) said that depletion of water tables as a challenge is high which is followed by erratic rain fall (49.5%). On the other hand, Damage of roads as a challenge of medium which counts 31.4% which is also followed by unemployment (25.3%). In line with this, the Existence of new input and existence of new technology interventions have been mentioned as in terms of creating enabling opportunities for better livelihood option. Accordingly 67.5% and 64.4 for the existence of new input and existence of new technology respectively are mentioned high in terms of creating opportunities.

Table 4. 11. Vulnerability context (trend, Shock and seasonality)

Challenges	**Frequency**				**Percent**			
	L	**M**	**H**	**T**	**L**	**M**	**H**	**T**
Depletion of water tables	28	61	105	194	14.4	31.4	54.4	100
Erratic rainfall	54	44	96	194	27.8	22.7	49.5	100
Un employment	20	86	88	194	10.3	45.4	45.4	100
Damage of roads	54	99	41	194	27.8	51.0	21.1	100
Opportunities								
Existence of new input	17	46	131	194	8.8	23.7	67.5	100
Existence of new technologies	17	2	125	194	8.8	26.8	64.4	100
Development of new WSD knowledge	19	61	114	194	9.8	31.4	58.8	100
Development of new WSD skill	19	71	104	194	9.8	36.6	51.6	100

Note: L = low, M=medium, H=high, T=total

Source: *Own field survey, 2014.*

In general, existence of new input, existence of new technologies and development of new watershed knowledge and skill are the opportunities gained after intervention, but depletion of water tables, erratic rain fall, unemployment and damage of roads were also still present as a challenges. In view of these, majorities of households stated that community based watershed development project intervention are guarantee for resilience household.

4.1.4. The livelihood assets and capabilities.

This section provides the main livelihood asset possessed and accessed by the sample community in the watershed household. Watershed is an access to community because of common pool resources and it is an asset for households because of private resources. Considering the watershed in its opportunities and constraining factors are presented in the following section. For the sake of clarity and simplicity, the assets are categorized according to DFID (2000) in natural, physical, financial, social and human capitals. The details of each are discussed below.

4.1.4.1. Natural Capital.

Land together with other resources implanted in it, constitutes the natural capital that normally influences the livelihood of farmers. This is because the livelihood earnings to be generated from the principal production activities: - crop production and livestock rearing depend on access to land (Yalew, 2010). Natural capital , in which livelihoods are derived, key to rural poor who focused, used and fronted his/her life in agricultural livelihood strategies

Table 4.12. The current status of natural capital in Aba Gollem and Sommi watersheds.

Natural Capital status	Rating	Aba Gollem		Sommi		Total	
Natural Resource degradation	1	9	5.7%	0	0.0%	9	4.6%
	2	21	13.3%	1	2.8%	22	11.3%
	3	128	81.0%	35	97.2%	163	94%
	Total	158	100%	36	100%	194	100%
Trends in Farm land	1	17	10.8%	3	8.3%	20	10.3%
	2	69	43.9%	16	44.4%	85	43.8%
	3	71	45.2%	17	47.2%	88	45.4%
	Total	158	100%	36	100%	194	100%
Trends in Grazing land	1	133	84.2%	34	94.4%	167	86.1%
	2	16	10.1%	0	0%	16	8.2%
	3	9	5.7%	2	5.6%	11	5.7%
	Total	158	100%	36	100%	194	100%

Note: 1:= Decreasing; 2= Remain the same; 3 = Increasing

***(Source**: Own field survey, 2014).*

Table 4.12 Showed that the status of natural capital such as natural resources, farmland and grazing land seen improved in two watersheds. According to survey data about 84% (163) reported that natural resources (land, forest, grasses) were improved following the EECME project intervention. The detailed data indicates that the status of NRs improvement in Aba Gollem 81% and Sommi 84%, which is Sommi watershed, is better improved than Aba Gollem watershed. The data obtained from FGDs, KII and field observation confirmed the fact that the watershed development intervention improved the natural resources. Whereas, 4.6% and 11.3% respondents said that the natural resources have decreased and remain the same respectively. As the respondents have said it, the area closure which prohibited using the natural assets in the watershed is mentioned to be the reason for decreasing and remaining the same in natural resource.

The data generated from survey output indicated that farm land size of household in the watershed community member experienced the change. In line with this, the result revealed that about 45.4% (88 respondents) said that farm land size of household becomes increased. This was due to rehabilitation of gully on top, bottom and around the farm land and also rehabilitation of damaged lands through terraces. However, 43.8% and 10.3% of respondents said that there is no change and decrease in farm land size respectively. This is due to the prohibition to cultivate the steep and hill side communal land. Table 4.12 also indicate that, in the case of Aba Gollem 45.2% , 43.9% and 10.8% and Sommi 47.2% ,44.4% and 8.3% rating their farm land as increasing, remain the same and decreasing respectively. From this it's clearly seen that Sommi is better than Aba Gollem in farm land increment trend. In line with this, in both watersheds data generated by FGD, KII and field observation indicated that farm land size of the watershed community members shows positive change.

Grazing land is one of the important natural resources of household particularly for those who exercise livestock rearing. According to the data generated from own observation the grazing land resources particularly, grasses and pastures in the watershed area is found and observed to be improved. The important thing here was not only improvements of the pasture but also the grassland size. The quantitative data in table 4.12 Indicated that about 86.1% house hold respondents said that the trend of grazing land is decreasing followed by 8.2% of household respondents who claimed that the size of grazing land remained the same. However, about 5.7%household respondents said that the size of grazing land increased. Even if

some respondents verified of the increment of grazing land status due to gully treatment, which on the contrary of this and there is changing of grazing land to farm land and over population is mentioned to be the contributing factors for decrease of grazing land. This fact supported by FGD and KII. The communal grazing land management survey result showed that about 80.4% household respondents said that they managed via cut and carry system. These are respondents who are beneficiaries of the area closure. 10.8% of respondents also said that there type of communal grazing land management via developing pasture. The remains 5% and 3.1% have managed agroforestry and free grazing management. The information obtained from FGD, KII and direct observation revealed that the forest resources in the watersheds shown progress. It has also seen that different indigenous tree plants and some exogenous plants were introduced in the watersheds.

Among introduced trees, Agam (Carissa educlis) and Girar (Acacia wussies) are some to be mentioned, whereas the exogenous ones are keye Bahirzaf (Eucalyptus camaldulensis), sesbanaia (Sesbania) and Gravilia (Gravilia Australia) which used to reduce environmental degradation.

Data from FGD, KII and field observation also revealed that river spring and hand dug wells are the source of water for watershed community households. The communities totally rely on these water sources for drinking and agricultural activities. Both spring water protection/ maintenance and hand dug well protection/ maintenance are how drinking and water supply activities are continued and conserved in the watershed communities. However, conflicts between household over irrigation water have reported to occur.

Opportunities

The different enabling opportunities of WSD project to better livelihood options of households. Natural resources in general have shown improvements after the intervention of project. Considering the different natural resource of the watershed before and after intervention, the opportunities of the watershed are presented in the following table.

Table 4.13. The Existence of watershed degradation feature before and after intervention

Watershed degradation feature before and after intervention	Before			After		
	Percent			Percent		
	Yes	No	Total	Yes	No	Total
Soil erosion by water	95.9	4.1	100%	34.5	65.5	100
Deforestation	92.8	7.2	100%	25.8	74.2	100
Overgrazing	93.8	6.2	100%	27.8	72.2	100
Range land degradation	64.9	35.1	100%	5.7	94.3	100
Forest degradation	63.4	36.6	100%	16.0	84.0	100
Lowering of water table	68.0	32.0	100%	29.9	70.1	100
Soil fertility decline	62.4	37.6	100%	12.9	87.1	100

*(**Source;** own field survey, 2014)*

The natural resource development in the watershed and with its improvement benefited both household and community. The information obtained from survey households, FGD and KII revealed that after the intervention of the project, all watersheds degradations that is soil erosion by water ,deforestation, over grazing, rangeland degradation, forest degradation, lowering of water table and soil fertility decline rate is reduced and showed improvement. According to the output the decline rate of soil erosion 34.5%, deforestation 26.8%, over grazing 27.8%, range land degradation 5.7%, forest degradation 16.0%, lowering of water table 29.9 % and soil fertility decline by 12.9%. From this watershed degradation, soil erosion and lowering of water tables accounts the highest frequency even after intervention as compared to other features.

Photo 4.4 watershed degradation feature before and after intervention in Aba Gollem *(**Source:** EECME, 2010).*

Challenges

The survey results from table 4.13 showed that even though, there are improvements in some natural resources of the watersheds, increasing natural resources degradation by 4.6%, 10.3% and 86.1% of respondents respectively is mentioned to be constraints of the watershed considering the current status. The information obtained from FGD and KII confirmed that watershed project has got problems of irrigation water and structure canal unable to drain the water properly. And less concern for key activities and appropriate technology are also found to be the contributing factor for the problem of water resources in the watershed.

4.1.4.2. Economic/financial Capital.

The contribution of the economic capital for the achievement of the livelihood goals along with other assets is very important. Access to financial resources for better utilization of the NRs in the watershed is core issue from the angle of sustainable rural livelihoods. According to survey household information the contribution of access to financial resources for watershed development is mentioned in different degree of agreement.

Table 4.14. Economic/financial capital contribution for WSD

Level of Agreement in contribution for WSD	Rating	Total
		Percent
Create income generation	1	1.0
	2	5.2
	3	56.2
	4	37.6
Create local rules and institutions	1	0.5
	2	4.1
	3	47.9
	4	47.4
Create employment opportunity	1	16.0
	2	23.2
	3	38.1
	4	22.2
Enabled to harvest water and use irrigation	1	18.6
	2	19.1
	3	35.6
	4	26.8

Note: 1 = Not at all, 2 = to some extent, 3= satisfactorily, 4= strongly

Aba Gollem = 158 and Sommi =36 Total =194

***(Source:** Own field survey, 2014).*

Table4.14. revealed that more than 80% of the respondents pointed out that the above outcomes are resulted in watersheds. However, employment opportunity and water harvesting and irrigation rates accounted less level as compared to others (those respondents who answered not at all and to some extent in their contribution for watershed development i.e. employment opportunity and water harvesting and irrigation were 39.3% and 37.7% respectively). In line with this data from FGD and KII confirmed that watershed projects has got problems particularly irrigation, water harvesting and employment opportunities. Specially problems in the structure canal unable to drain water properly to farm and irrigated lands.

Economic capital comprises economic activities those were important availability of cash or equivalent that enables to adopt different livelihood strategies. However, economic capital that focuses on both crop and livestock are main one in the watershed. Therefore in the following sections status, potential contribution and challenges are discussed.

Table 4.15. Trend of crop production and livestock population after intervention

Economical capital status	**Rating**	**Aba Gollem**	**Sommi**	**Total**
		Percent	Percent	
Crop production status	1	6.8	1.5	8.3
	2	23.7	7.2	30.9
	3	51.0	9.8	60.8
	Total	81.5	18.5	100
Livestock population	1	22.7	8.8	31.5
	2	16.5	1.5	18.0
	3	42.3	8.2	50.5
	Total	81.5	18.5	100

Note: 1:= Decreasing; 2= Remain the same; 3 = Increasing

*(**Source**: Own field survey, 2014)*

Crop production status :- According to the survey result,194 respondents 60.8% (51.0% in Aba Gollem and 9.8% in Sommi) said that crop production was increased ,where as 30.9% and 8.3% reflected that the production remained the same and decreased respectively. The justification behind those who said there was an increment of crop productivity due to intensification and diversification of crops in the watershed. The intensification was via the application improved seed and fertilizers. The diversities crop varieties of the area are mainly horticultural, cereals and pulses. However, those who do not use improved seed and fertilizer and irrigation among the respondents who said no change and decreased in productivity of the watersheds.

Crop production and its opportunity: - In crop production and productiveness irrigation is the pillar in general, particularly in drought prone areas. In the case of Aba Gollem and Sommi watershed community about 72.5% of respondents have land which can be irrigated inside the watershed. The household who have exercise irrigated farming have different opportunities than those who do not practice. Increased income, diversity of crops to minimize risk, improved productiveness and production and get nutrition food are some of the opportunities out of practicing irrigation. The problem of diversion and maintenance challenged not to get important benefits of using irrigation as expected.

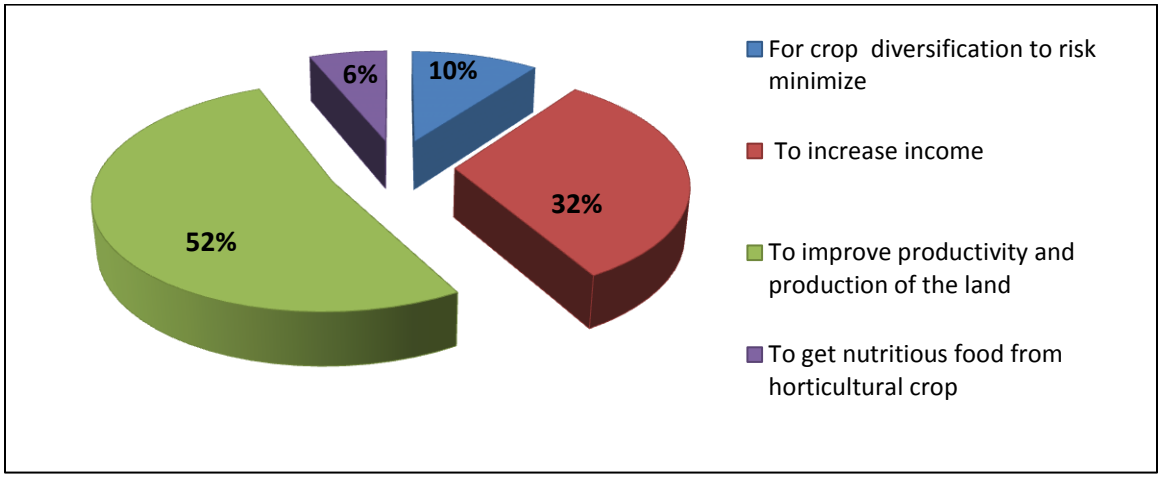


Figure 3 3.opportunities of crop production**.**

Crop production challenges:- The main challenges for crop production and productivity decline and remain the same were erratic rainfall, labor shortage, less access to input, drought, land shortage, soil erosion , pests and diseases of crops, low and poor irrigation system and lack of finances. More than 60% of respondents of household said erratic rainfall, shortage of land, low and poor irrigation system are among major challenges for crop production in the two watershed community households. The FGD participants and KII confirmed that above problems are the major challenges of crop productivity of watersheds. Labor shortage, less access to input and soil erosion are mentioned to be not as a problem for less productivity of both watersheds. Therefore, it can conclude the intervention does bring expected change in improvement of crop production and productivity.

Table 4.16. Challenges of crop production in the watersheds.

Challenges of crop production and productivity	Percent		Total
	Yes	No	
Erratic rain fall	65.5	34.5	100
Labor shortage	38.74	61.3	100
Less access to input	21.1	78.9	100
Drought	52.6	47.4	100
Land shortage	61.9	38.1	100
Soil erosion	19.1	80.9	100
Pest and diseases	56.2	43.8	100
Poor irrigation system	61.9	38.1	100
Lack of finances	61.3	38.7	100

***Source**: own field survey, 2004*

Livestock population status: livestock is an integral and important component of the livelihoods of resident households in watersheds. Out of 194 respondents, about 76.8% have their own livestock, but the rest don't have. The trend of livestock population in the watershed is reported to be increased in the table. In line with this 50.5% respondents reported that the livestock population is increasing in the two watersheds from time to time. However, about 18% of house hold respondent said that the livestock population don't show either decreasing or increasing trends, while about 31.5% of the respondents said the trend of livestock population is decreasing. Regardless of the different views on the trend of the livestock population over time, the reason for decreasing trend of livestock population is due to the decrease of grazing land due to area closure. The respondents who said differently on the trend of the livestock population over time have their own reasons and rationalities. For instance, those who said the livestock population is increased are beneficiaries from area closure.

Challenges of livestock population

Table 4 .17. Livestock constraints in the two watersheds

Livestock and its constraints	Percent	
	Yes	No
Livestock diseases	42.2	57.8
Lack of vet services	49.1	50.9
Low market interaction	34	66
Sector is not profitable	36	64
Scarcity of fodder	62.1	37.9

***Source:** Own field survey, 2014).*

Table 4.17 revealed that the main challenges of livestock in the watershed are scarcity of fodder (62.1%), lack of vet service (49.1%) and livestock disease (42.2%).The KII and FGD participants were also confirmed that the Afro mentioned problems are the impediments of the livestock production in the two study area (Aba Gollem and Sommi). The challenges have also in turn hindered immediate economic return of the watershed to the communities and put economical sustainability to be under question

Livestock and its opportunities

Traditionally, livestock production played an important role in the rural economy. On average17.5% of household. Respondents' income was derived from livestock production. Based on the data from KII, although scarcity of fodder, most critical constraints for livestock development in the study watersheds, recognizing the significant role of livestock under CBWSD project is 10% of the project cost earmarked for livestock. According to the same source (KII) additionally with FGD, main potentials of livestock development in the watersheds were income generation from fattening and dairy, biomass availability and better market linkage (dairy appears to make an increasing contribution to income with the help of market linkage with Gondar / Fasil milk production factory.

4.1.4.3. Physical Capital.

Ownership of assets particularly agricultural technologies, tools and equipment affect farm households' decision which is needed to support livelihoods of rural economy. The following components both biophysical structure and technological issues with their status, opportunities and challenges are discussed.

Biophysical structures

Biophysical structures include the physical SWC (Stone and soil bund, planting on bunds, Hill side terraces, cut off drain, micro basin and trench construction and gully rehabilitation), forest development, micro and small scale irrigation, livestock development, crop production development, drinking water supply and Road construction and rehabilitation.

Table 4.18. Biophysical structure status in the watersheds

Bio physical structure	**Aba Gollem**	**Sommi**	**Total**
	Mean	Mean	Mean
Soil and water conservation works	3.19	3.5	3.39
Forest development	3.13	3.19	3.16
Crop production	3.27	3.42	3.35
Livestock development	2.54	2.77	2.68
Road construction and maintenance	2.76	2.72	2.74
Micro and small scale irrigation	2.63	2.74	2.67
Drinking water supply	2.72	2.46	2.74

Note; 1 = Note at all, 2= to some extent, 3 = Satisfactory 4= strongly.

***Source**: own field survey, 2014*

Table 4.18 revealed that biophysical structure i.e. SWC, Forest development and crop production sector have a status of satisfactory (Average mean 3.39, 3.16 and 3.35). The rest also indicate that the major biophysical structures have been to some extent and above. Table 4.18 also revealed that some key biophysical structures such as livestock development, road construction, micro and small scale irrigation and drinking water supply in both Aba Gollem and Sommi watersheds leveled to some extent. According to the data from FGDs, which involved in both watersheds ranked activates as livestock development road construction and maintenance, micro small scale irrigation and drinking water supply as a problematic areas from first up to fourth. The information Obtained from direct observation and KII showed that the activities both irrigation and water harvesting are poor. However, SWC works and forest development and in a very satisfactory state.

The Technological issues

It is one of the physical assets, which supports household to pursue the livelihoods strategy in the watershed community.

Table 4.19. Access to feasible Agricultural Technology in Aba Gollem and Sommi Watersheds.

Agricultural technology	**Frequency**		**Percent**	
	Yes	No	Yes	No
Improved crop varieties	184	10	94.8	5.2
Improved farm equipment	101	93	52.1	47.9

***Source;** own field survey, 2014).*

According to the survey result of the study, about 95.9% reported that there is access to new technologies, while only 4.1% respondents said that there is no access to new agricultural technologies. Both improved crop verities and farm equipment's are reported to be accessed by 94.8% and 52.1%. Whereas, 52.1% and 47.9% of respondents confirmed that, there is no access to use improved crop verities and farm equipment respectively. In connection with this, workneh (2006) noted "sustainable agricultural intensification requires applying land management technologies and practices along with productivities increasing technologies and inputs." However, it is revealed such technologies of farm equipment in the study area are limited.

Opportunities and challenges of biophysical structure and technological issues

The physical assets which include both biophysical structures and technologies created opportunities for enhancing other assets particularly natural assets. The opportunities have brought about positive change in SWC works, forest development, and crop production and somehow road construction and drinking water supply. Whereas, livestock development and micro and small scale irrigation which results low economic return calls the attention on issues of sustainability are found to be the challenges to the watershed community. Besides this due to financial limitation materials such as gabion cannot be purchased and used so that stone bund on sloppy areas that need gabion could not be done (Sommi).

Photo 4.5.Damaged stone bund in Sommi (right), and miss managed Grasses in Aba Gollem *(**Source**: own field survey, 2014).*

4.1.4.4. Social Capital.

In the context of sustainable livelihood frame work it's taken to mean the social resource up on which people draw in pursuit of their livelihood objectives developed through network and connectedness, membership of more formalized groups, relationships of trust, reciprocity and exchange (Chambers et al, 1992).This part of analysis is addressed through FGD and was supported by KII and indirectly by household survey. FGD with CBO committee members both in Aba Gollem and Sommi was hold. The opportunities and challenges of social capital are summarized and presented as follows.

Opportunities

- Serves as responsible organ for the community based watershed development project.
- It eases mobilization of communities for development work.
- Created opportunity for regular discussions with community on development issues.
- Created opportunity of equitable distribution of project benefits.
- Make use of different provision of inputs, materials and equipment made by governments and donors for their intended purposes ease management of revolving loans.
- Ease management of revolving loans.
- Act as a link between communities and government on development issues.
- Building experiences of community managed development program implementations.
- Serving as role model and shares their experiences for other watersheds.
- Buildup of experiences of community managed development planning exercise.
- The achievements attracted and encouraged development partners (donors) and initiated them to be partnered with government to replicate same in other parts of the Woreda.
- Serve as demonstration site for others.

Challenges

- Buildup of dependency syndrome by some CBO committee members/community members i.e. looking for benefits from donors
- Complain of some committee members for burden of public responsibility at the scarification of their own farming responsibilities and so a shift of some of them from being a model farmer back to bad modeling.

- Some committee members see the public resources as their own personal resources and so create resistance when those resources are claimed for public purpose (mainly the x-committee members).
- Resistance by the X-committee members to transfer records, documents and/or any other information held to them because of their earlier responsibilities to the new committee members (Aba Gollem).
- Due to financial limitation materials such as gabion cannot be purchased and used so that gullies that need gabion check dam work, for example, could not be done (Sommi).

4.1.4.5. Human capital

It represents the skills, knowledge and ability to labor and that together enables peoples to pursue different livelihood strategies (Conway et al, 1992).

Table 4.20. Human capital status.

Training	**Percent**	
	Yes	No
Getting training	45	55
The training able to solve practical problem	62.4	37.6

Source: *own field survey, 2014*

Human capital is an important asset of individuals and households in the study watersheds (Aba Gollem and Sommi). It is developed through education, training and experience. According to the survey output data revealed that the majority 55% of house hold respondents do not have training, while about 45% respondents reported that they have got trainings. Based on the training given, about 62.4% respondents reported that they are able to solve some practical problems. While about 37.6% of household respondents have reported that they could not solve the problems based on the training given.

Opportunity and challenges of human capital

The watershed development has contributed to households to develop skills that became an experience sharing for other watershed development and management, which enables some of individuals, got training to solve some practical problems. The information obtained from KII and FGD demonstrated that the existence of the watershed development project in the area has

contributed the practical skill development of individuals and in turn, helped them to solve the problems related to IWM practices regarding to its challenges, peoples reported the trainings given to the watershed community are not based on the felt needs of farmers. The trainings are given only on few skills and do not address all the watershed community households, except those which are treated with SWC, forest development road construction and crop production.

4.1.5. The institution and participation in the watershed

Mediating institutions are organizations, process, social relation and policies that determine access to livelihood assets influences the livelihood activities pursued by the households. Participation and institutionalizing watershed are the corner stone of sustaining CBWSD for livelihoods (Assefa, 2011). The institution in the study are such and agricultural and rural development office and other informal institutions including Idir, and Mahiber coupled with participations of people are found to be mediating institutions. Managing and coordinating the watershed is the responsibilities of woreda Agricultural and rural development office and the assigned project (EECME). Even though the role of Idir ,women's association and Mahiber in the watershed is important for coordination and mobilization of the local communities: the linkage with woreda agricultural and rural development office is reported to be week and hence the watershed communities has lost important benefits out of the multiple roles of the informal institution. This could be considered as the gap in implementation of the watershed and FGD participants confirmed the fact.

The existence of institutions without the participation of the direct beneficiaries and stakeholder don't bring the anticipated results. In line with this Lakew et al (2005) noted that the key for the success of CBWSD in creating self - supporting systems, which is essential for sustainability lies on people's participation and integration. The KII and FGD participated reported that community participation is existed more during pre-planning discussion in watershed of the activities but less other types of participations. The qualitative data also supported the fact.

Table 4.21. Participation of the communities in Aba Gollem and Sommi Watershed**.**

Participation	**Yes/No**	**Aba Gollem**	**Sommi**
		Percent	Percent
Pre planning discussion	Yes	57.4	17.6
	No	23.9	1.1
During planning	Yes	20.7	1.6
	No	60.6	17.0
During implementing of activities	Yes	55.3	13.8
	No	26.1	4.8
Monitoring and evaluation of activities	Yes	52.1	8.5
	No	29.3	10.1

Source*: Own field survey, 2014*

In general, the mediating process both institutionalizing the watershed and participating the communities were good enough in both watersheds. However, in both watersheds, the above table revealed that those said they were participants during planning of the watershed is only 21% as compared to those said no (77%). This in turn, affected the development of watershed and its contribution for the livelihood improvement of the household in the community.

4.1.6. Livelihood Activities

The livelihood activities of the household in the study can be broadly categorized into agricultural livelihood activities and non- agriculture livelihood activities. The details of each livelihood activities are presented in the following subsection.

4.1.6.1. Agricultural livelihood activities

Cereals (Wheat, teff, sorghum), Pulses (pea, bean, chickpea) were the important crops cultivated before the project implementation. FGD data of the study revealed that the households in the watershed community have started diversifying crop cultivation by improving and the existing ones and introducing other new type of crops due to enabling things of the watershed. Cultivation of cash crop (Apple, papaya, coffee, cabbage, onion etc.), which were uncommon before the watershed project are currently introduced. Crop diversity (as against mono- culture agriculture) is generally taken as an indicator of sustainable agriculture. This is the impact of watershed development intervention especially on agronomical practices that are promoted to see the changes in cropping pattern and crop varieties (Paranjape et al, 1995). The watershed community household also exercise bee keeping using modern bee hives because the project has

improved the natural resources. The following table depicts that different agriculture livelihood activities of house hold in the watershed community.

Table.4.22. Agricultural livelihood activities**.**

Agricultural activities	**Aba Gollem**		**Sommi**	
	Percent		Percent	
	Yes	No	Yes	No
Farming own land	75.3	6.2	18.0	0.5
Livestock rearing (dairy and fattening)	55.2	26.3	10.8	7.7
Vegetable garden	61.9	19.6	14.4	4.1
Bee keeping	30.4	51.0	6.2	12.4
Poultry	39.7	41.8	7.7	10.8

Source*: Own field survey, 2014*

The table showed that households in the study area are exercising diversification and experienced the livestock rearing as part of the diversification strategy of livelihoods. The intervention WSD project has supported both diversification and intensification strategies in number of ways Assigned project have paid specific attention to provide opportunities to the poor to diversity their livelihoods. Data from FGD and KII confirmed that CBWSD open new opportunities for household to intensify and diversify production through increasing the frequency of cultivation, adopt new technologies and also through expansion of cultivated areas. As a result both intensification and diversification generates employment opportunities for house hold.

Photo 4.4 Red Apple production in Aba Gollem (left), and Apple plantation in Sommi (right) *(**Source**: Own field survey, 2014).*

4.1.6.2. Non – Agricultural income generating livelihood activities

The Non - Agricultural activities have significant importance of the rural setting and particular option for agricultural land less farmer households in the study area. They exercised non–agricultural income generating activities to complement the agricultural activities or as the major livelihood activity. In this regard about 25%, 21%, 10%,17.5% of household respondents exercise saving / credit in the cooperatives, selling fuel woods and charcoal, renting out fields, and hand craft/local manufacture.

In most instances, the non – agricultural livelihood strategies supplement agricultural activities. Accordingly to information obtained from lay armachiho woreda women affair offices, the non – agricultural income generating activities are worthwhile to note the non-agricultural source of income portfolios are important for the land less , youth and female farmers.

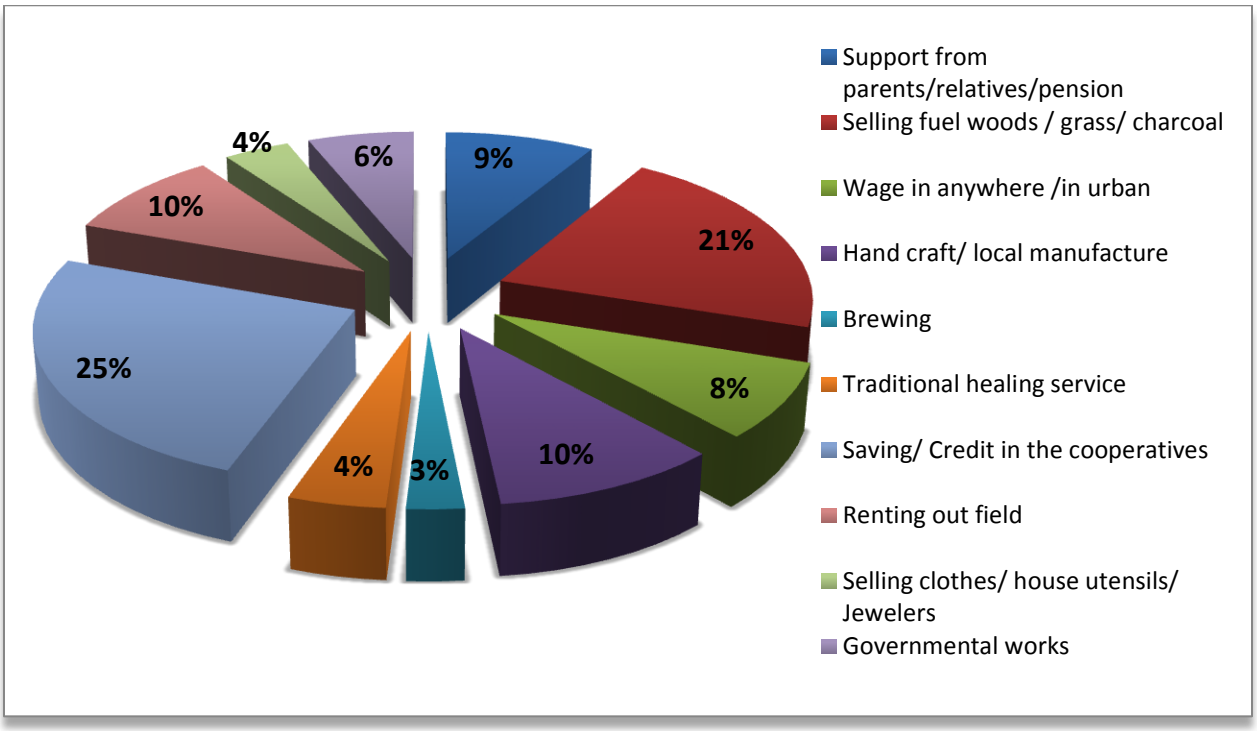
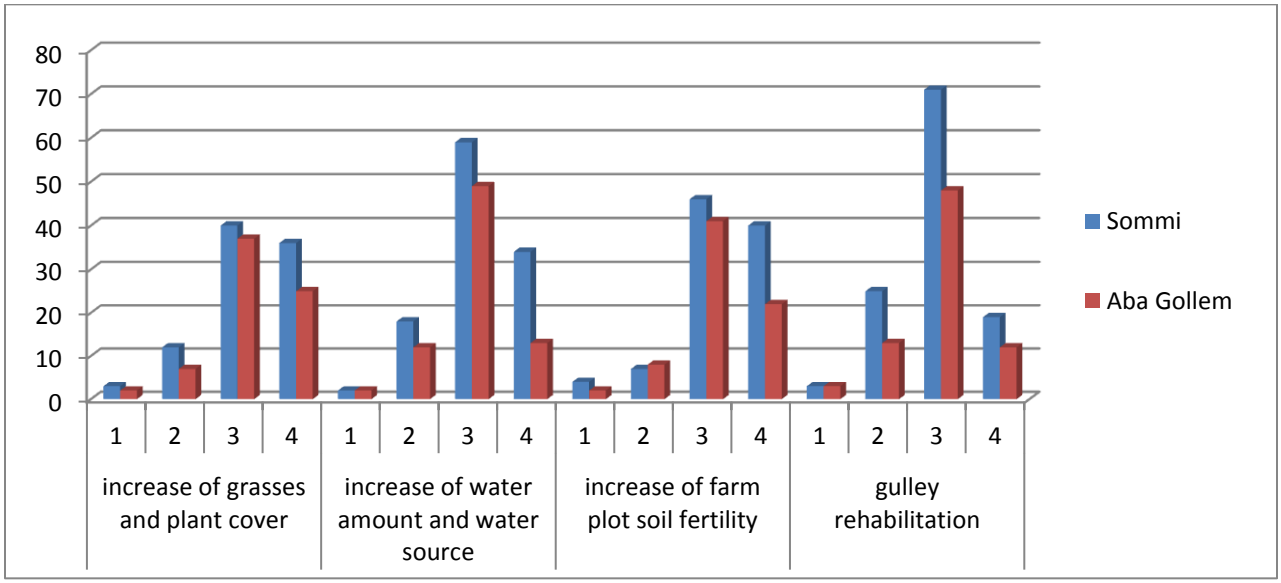


Figure 4. Percent of respondents on key Nonagricultural income generating livelihood activities.

4.1.7. Responses/out puts on outcomes of CBWSD

4.1.7.1. Ecological outcome response



Note: 1 = Not at all, 2 = to some extent, 3 = satisfactorily, 4 = strongly;

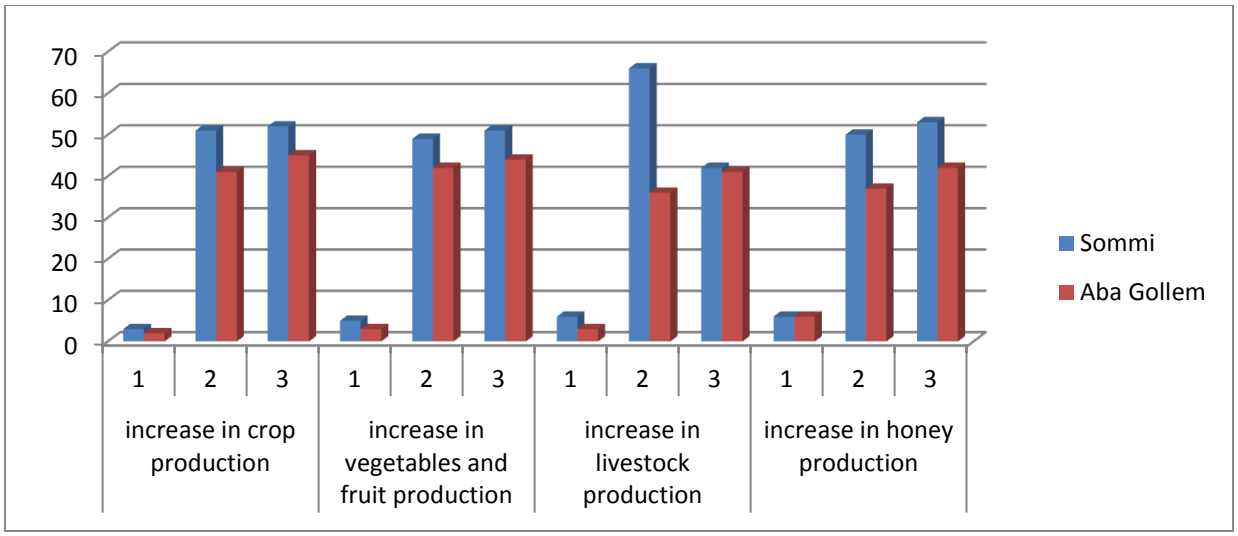
Source; *Field survey, 2014*

Figure 5. Ecological response of the CBWSD outcomes in the watershed areas.

Figure 5. Clearly shows that the generally, the ecological outcomes in both watersheds for the selected factors are almost similar and it is at the level of satisfactorily and strongly except gulley rehabilitation. However, increase of water amount and water source most of the respondents in Aba Gollem agreed that it is at the level of satisfactorily where as in Sommi most of the respondents agreed as it is both satisfactorily and strongly. In gully rehabilitation, more proportion of respondents in Sommi than in Aba Gollem agreed that it is at satisfactorily level.

4.1.7.2. Economical outcome response

Figure 6 presents that an increase in crop production, increase in honey production and increase in vegetable and fruit production, the proportion of responses are the similar in both watersheds, which is increased by some amount and by two folds or more level, which shows that the economic return is in a good state. Increase in livestock production, most of Sommi respondents agree at the level of increased by some amount whereas more of Aba Gollem agrees at the level of by some amount which indicates that in terms of economic response from livestock production, Sommi is better than Aba Gollem.

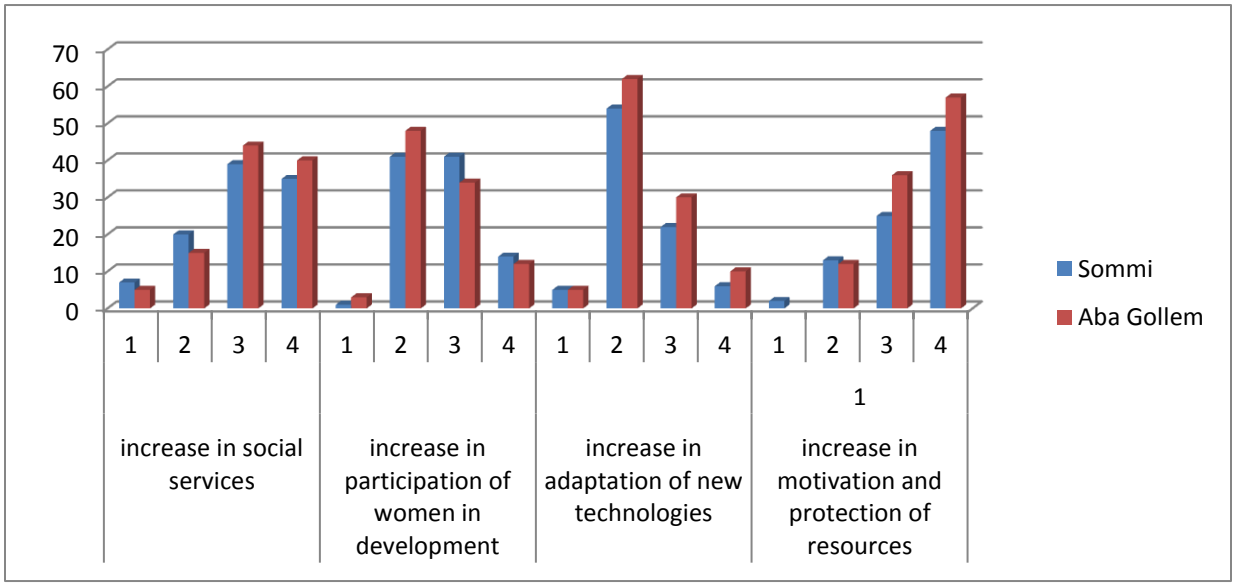


Note: 1= No, 2=Yes, increased by some amount 3=Yes, increased by two folds/ more.

***Source**: Own field survey, 2014*

Figure 6. Economical response of the CBWSD outcomes in the watershed areas

4.1.7.3. Social outcome response



Note: 1 = Not at all, 2 = to some extent, 3 = satisfactorily, 4 = strongly;

***Source:** own Field survey, 2014*

Figure 7. Social response of the CBWSD outcomes in the watershed areas.

Figure 7 reveals that the social outcome response situation in both watersheds are similar for all the factors considered except at the case of increase in adaptation of new technologies, where

the case is better in Aba Golemm than in Sommi. Taking another social factor of increase in participation of women in development, though the situation in the same in Aba Gollem watersheds is better than Sommi at the level between to some extent and satisfactorily indicating that there is some gap as to the improvement of women participation in CBWSD implementation process. In the case of increase in motivation and protection of resources Aba Gollem is better than Sommi which is in the level between satisfactorily and strongly. This is because in Aba Gollem there is already a shift from free grazing system in to cut and feeding system of livestock feeding because of the availability of sustainable grass/fodder/source for their livestock from the area closure sites. And these sites are found in such situation because of the effective role of watershed users association in managing the area closure sites. Therefore, people are better motivated for protection of communal resources in Aba Gollem than in Sommi. On the contrary, in Sommi, the area closure sites are kept by salaried guards and still less community member who started benefiting from grass/ fodder/ from the area closure site and hence many are not satisfied and motivated for protecting communal resources as evidenced in Figure 5.

4.1. Inferential Analysis

4.2.1. Comparing watersheds in level of continuity of IWM practices

Table 4. 22 Mean or average level of status of IWM Practices by watershed

		SWC	Forest	Crop	Livestock	Road	Irrigation	Water supply
Watershed	Sommi*	3.5710	3.53	3.81	2.67	2.74	2.8733	2.88
	Aba Gollem**	3.3601	3.22	3.47	2.53	2.65	2.7342	2.84

*36 **158

Table 4.23 Independent sample test (T-test) for equality of means by component

Independent Samples Test										
Levene's Test for Equality of Variances				**t-test for Equality of Means**						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
SWC work	1	5.248	0.023	2.078	192	0.039	0.21093	0.10150	0.01074	0.41112
	2			2.256	57.647	0.028	0.21093	0.09348	0.02378	0.39808
Forest Development	1	5.487	0.020	2.133	192	0.034	0.352	0.165	0.027	0.677
	2			2.390	60	0.020	0.352	0.147	0.057	0.646
Crop Production	1	20.693	0.00	2.998	190	0.003	0.338	0.113	0.115	0.560
	2			3.348	60.336	0.011	0.338	0.101	0.136	0.539
Livestock Development	1	3.152	0.007	1.903	192	0.059	0.353	0.186	-0.013	0.720
	2			2.307	68.270	0.024	0.353	0.153	0.048	0.659
Road Construction &Maintenance	1	3.188	0.076	1.383	192	0.168	0.237	0.171	-0.101	0.575
	2			1.517	58.468	0.135	0.237	0.156	-0.076	0.550
Micro &Small Scale Irrigation	1	15.485	0.00	0.620	192	0.536	0.09916	0.15985	-0.21612	0.41444
	2			0.794	75.531	0.430	0.09916	0.12487	-0.14956	0.34788
Drinking water supply	1	0.626	0.430	2.393	192	0.018	0.408	0.171	0.072	0.745
	2			2.569	56.794	0.013	0.408	0.159	0.90	0.726

Note: 1= Equal variances assumed 2= Equal variances not assumed

***Source**: own field survey, 2014).*

Table 4.21 and Table 4.22 shows that at 95% level of confidence, the independent sample t-test analysis reveals that except road construction/maintenance and drinking water supply components (where p values are greater than 0.05), all other components are significant (p value less than 0.05). This means that there is no significant variation between Sommi and Aba Gollem concerning the level of continuity of road construction and maintenance and drinking water supply components ,where as there is significant variation between Sommi and Aba Gollem concerning the level of continuity of SWC ,forest development, livestock development, micro and small scale irrigation and crop production components of the IWMP indicating that the difference in the level of continuity in these components is not simply by chance but due to difference in influencing factors like the difference in the role of CBOs in each watershed for the continuity of IWMP. In short, the level of continuity of SWC, forestry, livestock, micro and small scale irrigation and crop production components are better in Sommi than in Aba Gollem whereas the level of continuity of crop production is better in Aba Gollem than in Sommi. However, the levels of continuity in road construction and maintenance and drinking water supply components are almost similar in both Aba Gollem and Sommi.

4.2.2. Challenge level of community based watershed development with selected variables

Table 4.23. Challenge level

Variable	Categories	Challenge Level		Crude p-value	COR(95%CI)	AOR(95%CI)
		Low No. (%)	High No. (%)			
Kebele	Sommi(ref.)	31(23%)	5(8.2%)		1	1
	Aba Gollem	102(76.7%)	56(91.8%)	0.016	3.404(1.253,9.246)	3.434(1.186,9.948)
Sex of Household Head	Male	81(60.9%)	48(78.7%)	0.016	2.370(1.171, 4.797)	3.050(1.329, 7.000)
	Female(ref.)	52(39.1%)	13(21.3%)		1	1
Watershed community membership	Yes(ref.)	128(96.2%)	51(83.6%)		1	1
	No	5(3.8%)	10(16.4%)	0.005	5.020(1.635, 15.408)	7.066(1.665, 29.992)
Market facilities	Not at all	6(4.5%)	6(9.8%)	0.004	9.500(2.056, 43.888)	5.788(0.898, 37.297)
	To some extent	17(12.8%)	10(16.4%)	0.009	5.588(1.534, 20.360)	6.083(1.579, 23.435)
	Satisfactory	72(54.1%)	41(67.2%)	0.003	5.410(1.802, 16.241)	6.314(1.997, 19.963)
	Strongly(ref.)	38(28.6%)	4(6.6%)		1	1

***Source**: own field survey, 2014).*

Regarding challenge levels of community based watershed development with selected variables (table 4.23) thirty one (23.3%) of Sommi kebele and one hundered and two (76.7%) of Aba Gollem watershed users were challenged by CBWSD giving a total of 194(100%) watershed users. Therefore watershed users those lived in Aba Gollem kebele were 3.434 times more likely challenged by watershed development project as compared to Sommi kebele (AOR (95% CI), 3.434 (1.186, 9.948), p=0.016).This may be due to both the physical and topographical location of Aba Gollem is unsuitable for micro and small scale irrigation and access to market as compared to Sommi kebele.

The findings of the above table also show that the challenge level of sex of household eighty one (60.9%) of males and fifty two (39.1%) of female watershed users with low level of challenge. From the variables of sex of household heads, those male watershed users were 3.050 times more likely highly challenged in community based watershed development project as compared to those were female heads of household(AOR (95% CI), 3.050 (1.329, 7.000),p=0.016).This is true in any community based watershed development project intervention women's sector is to develop the capacity of women's to enabled them to actively participate and taken up responsibility for integrated and sustainable development of their watershed. When the project was launched in 1994 G.C, women's were included in the overall program strategy but not as a separate sector .But before three years women's were given special attention ,their effective contribution in watershed development was realized .This might result women's beneficiaries in the project. This finding is consistence with the study by Marcella D'Souza (1998).

From binary logistics regression analysis shown in table 4.23, those hadn't market facilities at all were 5.788(AOR (95% CI), (0.898, 37.297), p=0.004) times more likely challenged as compared to those had better market facilities .The capacity of watershed ecosystems provide essential goods and services that has led to increase in support to human well-being .These include direct and indirect economic benefits .So that access to market facilities is decisive factor to success in sustainable livelihood for watershed communities effort in strengthen economic access to food which can built only if agricultural/horticultural, livestock and forest products are effectively marketed by farmer. A study by Sylvia S. (2005) also reported the same result.

Table 4.23 also revealed that in binary logistics table those respondents who are not watershed community membership were 7.060(AOR: (95% CI), (1.665, 29.992), p=0.005) times more likely challenged by community based watershed development project as compared to those were members of watershed community .The above model analysis revealed that watershed community membership is the key determinant in the success of watershed development program, being member in watershed users group is essential that is not only in the private property of resources but also the common property resources. This could be due to the reason that employment opportunity for watershed community members are increased with better wage earnings in construction work during pre-watershed and engagement in agricultural field during post watershed programs.

CHAPTER-FIVE
CONCLUSSIONS AND RECOMANADATIONS

5.1. Conclusions

Based on the facts presented in forgone chapters, the key findings of the study in summary are presented in this chapter. Based on the finding of the study, the chapter also forwarded possible ways, which can be used for the local implementer of the project, planners and concerned stakeholders.

To start with, existing livelihood strategies in the study area, the dominant livelihood activities of households in the watershed have been identified to be farming own land, livestock rearing, vegetable garden, bee keeping using modern bee hives and poultry. And non-farm income generating activities also have been identified to be saving / credit in the cooperatives, selling fuel woods and charcoal, renting out fields, and hand craft/local manufacture. The existence of the community based watershed development project in the area with its enabling opportunities, has contributed to diversify their livelihood portfolio.

The analysis result shows that livestock development sector, road construction and maintenance, drinking water supply and micro and small scale irrigation in both watersheds have continued at least to some extent and above within the donor support. However, the level of status of continuity, in SWC, forest development and crop production have continued satisfactorily and above rate. Hence it can be concluded that CBWSD has been continued in the study watersheds with different strength of continuity among components and by watershed that explains the different contexts between the watersheds and the difference in roles played by watershed users between watersheds and by component.

Particularly using FGD discussions and Key informant interview as well as from implications of household survey it was found that the main challenges and opportunities of community based watershed development from sustainable livelihood were the following:

The natural capital, particularly farmland, and forest were improved due to the existence of the watershed project in the area. The natural resource improvements in the watershed are used as opportunity for the watershed community household. As result, households have benefited in terms of ease access to fodder for their livestock and reduction in land degradation. Above changes observed economic return became high on which the extent of improvement in crop productivities and production is in the way of expected. And less concern for key activities and appropriate technology are also found to be the contributing factor for the problem of water resources in the watershed.

In economic capital, the problem of diversion and maintenance challenged not to get important benefits of using irrigation as expected. The main challenges for crop production and productivity were erratic rainfall, labor shortage, and less access to input. In line with this, main opportunities of livestock development in the watersheds were income generation from fattening and dairy, biomass availability and better market linkage. The main challenges of livestock in the watershed are scarcity of fodder, lack of vet service and livestock disease.

The study has also identified the main challenges and opportunities of physical capitals created opportunities for enhancing other assets particularly natural assets. The opportunities have brought about positive change in SWC works, forest development, and crop production and somehow road construction and drinking water supply. Whereas, livestock development and micro and small scale irrigation which results low economic return are found to be the challenges to the watershed community.

Based on the generated data form human capital, the participation of the watershed community households is manifested in different stages project activities and about 90% respondents reported the they have participated during implementation, whereas less than 50% respondents of households have been participating during pre-planning, planning, monitoring and evaluation. However, more than 55% of them lack to get training

According to the study opportunities and challenges of social capital are listed below. Therefore, the conclusion is that watershed users created an opportunity of being served as a responsible organ to implement CBWSD in the watersheds and in linking Government and development practitioners' with the community for common goal of achieving CBWSD . However, challenges are related to watershed user's committee management.

The last objective was to assess the ecological, economical and social responses brought about by the overall implementation CBWSD project in both Aba Gollem and Sommi watersheds and the analysis shows that both the ecological, economical and social responses are almost have improved between to some extent and satisfactorily, except ecological responses have improved between satisfactorily and strongly. Therefore, it can be concluded that ecological, economical and social responses are already started in the study watershed and will continue in the future since responses of CBWSD are long term.

5.2. Recommendations

Based on the facts obtained from the study, this particular research forwarded the following recommendations.

Since the livelihood strategies (agricultural activities) before the project was both farming and traditional livestock production and its trends were decreasing but it is found to be after the project intervention the situations have been reversed. Therefore, such interventions should be designed and promoted to the other similar areas. The contribution of non-agricultural in supporting the livelihoods of rural household is indispensable, but compared the household who engaged in agricultural activities, the households who are exercising non-agricultural income generating activities as the major livelihood activity are few. To solve the problems associated with increasing trends of land shortage, non-agricultural income generating activities should give due attention and promoted via institutionalizing and socializing the watershed.

The levels of livestock development in Aba Gollem have almost continued with 2.53 averages mean which is the least one as compared to others. This was because of two factors: first watershed users association were not able to revolve the EECME supported livestock provisions due to lack of documents and records transfer from the old committee to the new committee and secondly, due to the conflict of interest with Woreda finance and economic development office on management of grass benefit from the area closure site, the grass is simply wasting instead of being serving as a fodder for livestock. The interference of the office is against the CBWSD and had already created strong dissatisfaction and suspicion on all efforts by the watershed users. Therefore, The Gondar zuriya Woreda agriculture office should take remedial action as soon as possible to settle such disputes and let watershed users play the intended role on livestock development in the watershed.

The economic returns is not good enough due to the damage of the irrigation canal and it has disappointed and affected the motivation of farm households in using irrigation, which will have valuable contribution in increasing production and productivity. Therefore, concerned body, particularly the Woredas Agriculture and Rural Development and EECME should take action to maintain the canal.

The study revealed that technical human asset were low in the community that the majority of watershed community does not get training, as result solving some practical problems is found to be challenging. Therefore, to achieve the anticipated goals of the watershed and improve the livelihoods of household, training particularly on institutionalizing, socializing and on income generating activities should be given to the watershed community members.

Some watershed committee members complain that their public responsibility sacrifices their family farming responsibility and so being changed from model farmer back to bad modeling. This is a valid complain and government and development practitioners should share this and take the necessary precaution not to allow selection of some persons repeatedly in every social and public affairs.

CBWSD program is a key strategy to achieve natural resource conservation based livelihood improvements among the rural communities particularly in the highlands of Ethiopia, where land degradations and its consequences are series. Therefore, in such areas when implementing CBWSD program, the establishment and strengthening of such watershed users association per watershed should be included because this research result shows that many of their roles are significant and positive for the continuity/sustainability of watershed development activities.

Integrating practically these institutional, social, economic, technical, technological, environmental and physical aspects should be imperative not an option to sustain livelihoods the rural community in the watershed.

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Annexes

Annexes

Annex: I- Logical Framework of EECME on FSDP

Intervention Logic	Objectively verifiable indicators	Means of verification	Assumptions
Goal: To contribute to promote the food security of the target community through rehabilitating ecological balance and improving the livelihood conditions of the people inhabiting in the waters shed.	-Improved livelihood and sustainable ecological system in the target watersheds.	-Documentary films -Physical observation -Partners report -Focus group discussion	-The prevailing peace and stability in the country and in the region continues. -Secured fund
Objective 1: Increase agricultural production and productivity, and income of the target community in the targeted watersheds at the end of the project period.	-Change in people's attitude towards improved agricultural technologies & practices increased production and productivity in the target community.	-Documentary films -Physical observation -Key informants	-Strong collaboration among stake holders and Government offices.
Objective 2: At the end of three years project, the environment/natural resource rehabilitated (land, water and vegetation) and became more productive in the three watersheds.			
Objective 3: Increase and diversify the income level of target HHs by creating access to saving and credit services of the target community.			
Objective 4: Improve the coverage of potable water supply and promoting safe health behaviors in sanitation, hygiene, HIV/AIDS and HTPs among the target community			

Output 1: ➢ 2 high land fruit production, dem. And multiplication site well managed ➢ 25000 rootstocks multiplied,12000 seedlings propagated at project site and 10320 distributed. ➢ 3500 seedlings propagated at farmers field. ➢ 1 high land fruit cooperative strongly organized and managed. ➢ Improved variety of field pea/beans introduced. ➢ 2865 farmers trained and skilled	-Employment opportunity for54 (30 FHHs and 24 MHHs) at project high land fruit sites. -2374 HHs out of which 594 FHHs and 1780MHHs got lessons from project High land fruit demonstration and multiplication sites. - 10320 high land fruit seedlings propagated at project nursery and benefits to 688HHs(138 FHHs and 550MHHs) -1304 HHs out of which 260 FHHs and 1044 MHHs benefited from high land fruit production. -70 HHs skilled and propagate 3500 highland fruit seedlings(17 FHHs&53 MHHs) -Existence of functional and sustained high land fruit producers cooperative. -Increased production and productivity; replication of improved varieties (pea/beans and potato). -1865 HHs (373 FHHs and 1492 MHHs) on improved agricultural innovation and practices.	

Annexes

Activities:1.1 • Running and Establishment of 2 project highland fruit production, demo. and multiplication site. • Multiplication of 25000 rootstocks at project site. • Propagation of 12000 seedlings at project site. • Distribution of 10320 apple seedlings • Propagation of 3500 seedlings at model farmers field. • Establishment of 1 high land fruit producers cooperative. 1.2 Introduction of 49Qt improved varieties of potato and field pea/beans 1.1.3 Training for 2585 farmers on highland fruit, vegetable production, compost preparation and moisture observation. 1.1.4 Framer to farmer experience sharing for 280 model farmers. 1.1.5 Training for 7 project staff on high land fruit production and mgt.	Well managed project High land fruit demo.& multiplication sites. -Target beneficiaries skilled on Multiplication, propagation and management of Highland fruit. -New varieties of pulses and potato replicated.	Observation Reports Project documents HH survey	-Cooperation from government offices and target community
Objective 2: At the end of the three years project, ecological balance rehabilitated in the three watersheds by harnessing, conserving and developing natural resources i.e land, water and vegetative cover.	-Less fragile environment, improved land capability and land use. -Increased discharge of springs, water wells and perennial flow of intermittent streams. -Bio-diversity replenishment.	-Survey. -Focus group discussion. -Physical observation reports	Strong collaboration among stakeholders Strong community Mobilization and participation

Annexes

Out put 2.1 ▪ 680000multipurpose seedlings raised and distributed ▪ 216000 multipurpose seedlings raised and planted at 180 HHs private nurseries. ▪ 93 km soil/stone bund and cutoff drain,5430 m3 stone,gabion,9300 trench and micro basin constructed on the target watersheds. ▪ 30 ha protected and within it 3ha planted. ▪ 179 target groups trained and skilled. ▪ 3 strong and well organized watershed committee existed.	Job opportunity for 84HHs (54 FHHs and 30 MHHs) at project Nursery sites. -Multipurpose trees, fruits, grasses seedlings survived and contributed for ecological balance. -Seedlings raised by model farmers create substantial income. -Physical and biological conservation measures reduced soil erosion, increase vegetation cover, moisture and fertility. -Attitudinal change on using fuel and energy saving stoves, improves health status of women, reduces workload and save time of the target community. -Reduces soil erosion, increase natural vegetation, provide lesson for animal feed as cut and carry system. -Opportunities for diversified activities(apiculture, fruit) 15HHs(3 FHHs and 12MHHs) -Adopt more than one copping mechanism. -Effective and sustained watershed committee.	Physical observation Reports from -Woreda ARDO -Project	Cooperation from Government offices and the target community. -Secured land ownership -Communal lands Provided to landless youths.
Activities: 2.1 ✓ Production of 680000 multipurpose trees, fruit, forage and grasses seedlings at project nurseries. ✓ Support 180 HHs to produce 216000 seedlings on private nurseries. ✓ Study 1 new sub-watershed ✓ Establishment of 3 watershed committee. ✓ Construction of 93 km stone/soil and cutoff drain. ✓ 5430 m3 stone, gabion, biological	-Increase survival rate of seedlings and replication of private owned nurseries. - Existence of stable physical and biological conservation measures. - Existence of rehabilitated Gullies. - Existence of functional watershed committees. - Trained and skilled target groups on sustainable NRCM.	-Physical observation Reports from:- -Stakeholders -Project	-Cooperation from Government offices and target community.

Annexes

check dam. and 9300 trench and micro basin construction on the target watersheds. ✓ 30 ha area closure and 3 ha plantation. ✓ Training for 170 target HHs on NRM and 9 on integrated watershed development approach. ✓ 2 WWDTT establish and train. ✓ Training for 9 line office and 6 project staff on climate change. ✓ Training for 3 project staff on GIS.			
Objective 3: To increase and diversify the income level of the target HHs by creating access to credit services of the target community.	-Created credit access and increased average income of the vulnerable HHs.		
Out Put 3.1 ▪ 30 modern and 60 transitional beehives provided. ▪ 180 k.g wax purchased. ▪ 15 set of accessories provided. ▪ 177 HH sheep/ goat provided. ▪ 9 washera breed ram provided. ▪ 300 HH business plan prepared for shoat producer. ▪ 3 saving and credit cooperative organized and managed. ▪ 210 HH trained on apiculture and shoat production and mgt.	- 15HHs (3FHH&12MHHs) benefited from improved bee production and honey yield increased to 60%perhive. - 177HHs (150FHHs & 27MHHs) increased income, create asset, and obtained social acceptance; psychological relief. - Existence Sustainable saving and credit cooperative. - 270 Female & Male HHs oriented & led on business plan. - Existence of functional & sustained cooperatives - Skilled on Shoat and apiculture.	-HH survey -Reports -Physical observation. -Project report.	-Strong cooperation and collaboration at all levels. -Market stability. Cooperation at all level.

Annexes

Activities 3.1 -Provision of 30 modern and 60 transitional beehives. -Purchase of 180 k.g wax. -Provision of 15 set of accessories. -Provision of shoat for 177HH. -Introduction of 9 wahsera breed ram. -Business plan preparation ion for 300 HH on shoat producer. -Establishment and follow up of 3 saving and credit cooperative. -Train 30 HH on apiculture and 180 HH on shoat production.	-15 HHs(3FHHs&12MHHs)earn About 4400 Eth.Birr/annum. - 177HHs(150FHHs&27MHHs)earned about 2000Etb/annum & engaged on different IGS activities Functional and organized saving and credit cooperative.	-Physical observation. -Project report.	-Cooperation at all level.
Objective 4: Contributing to improve the coverage of potable water supply and promoting sanitation and hygiene practices of the target community**.**	-Increase potable water supply coverage by 12%, sanitation and hygiene by 10 % of the target community.	-Focus group discussion -physical observation -Reports	-Strong participation of Target community &Government. -Stable Market
Output :4.1 3springs developed and 3 hands dug wells constructed. 12 simple hand tools provided. 300 private latrine preparations supported. 192 HH trained on WASH and improved home mgt. 27 Line office and project staffs trained on WASH	-Reduce water born diseases. -660 HHs (35FHHs&625MHHs) got access to potable water and appropriate sanitation and hygiene services. -reduces water born diseases (human& animal), women and children work load& time taking to fetch water. -Improve sanitation and hygiene practices (washing hands before& after eating, availability and utilization of pits, waste& liquid disposal) by 10 %. -18 Females & 24 Males capable& skilled WASH committees.	-Physical observation -Project Reports -Records from Government Offices.	
Activities 4:1	Water schemes developed and functional		

Annexes

-3 Spring development -Construction of 3 hand dug well -Provision of 12 simple hand tools -Support 300 private latrine preparation - Trian 42 community members on WASH -Train 150 HH on improved home mgt. -Trian 20 line office and 7 project staff on WASH.	Private latrines constructed and functional Household houses improved	-Physical observation. -Project reports	
Objective: 5 Contributing to increase the awareness level of the target community on Gender and development, HTP and HIV/AIDS.	Gender equality promoted. -HTP,HIV/AIDS awareness increased.	-Records -Case study -H.H Survey	-Cooperation and collaboration from Government and Target community.
Out put 5:1 **-**300 HHs trained on gender and development. -37 line office and project staff trained on gender and development. -1890 community members created awareness on early marriage, milk teeth extraction, Uvula cutting, HTP practitioners. -40 line office and project staff trained on HTP. - 1800 community members trained on HIV/AIDS and reproductive health.	-Reduce male dominance and empower women in decision making. -90% of HHs well understood the Ethiopian law on early marriage, milk teeth extraction, Uvula cutting and HTP. -6 functional tea/coffee clubs existed. -Reduce practice on early marriage.	-Project reports. -Physical - observation	

Annexes

Activity: .5.1 **-**Train 300 community members on gender and development. -Train 30 line office and 7 project staff on gender and development. -Awareness creation community • 600 on early marriage • 600 on milk teeth extraction • 600 on Uvula cutting -Train 90 HTP practitioners -Train 30 line and 10 project staff on HTP. -Train 1800 community members on HIV/AIDS and reproductive health.	Participation of women on decision making increased Participation of women on development agendas HTP practices reduced	-Project reports -Physical observation. -HH survey	
Inputs Human power, Fund &Material.			

Annexes

Annex – I1. Questionnaire for Household survey

Study Title: - Challenges and opportunities of community based watershed development from sustainable livelihood perspective.

Study Objective: - To investigate the main challenges and opportunities of community based watershed development from sustainable livelihood perspective in the study area.

Researcher:- Samuel Mulugeta M.A student in Natural Resource and Environmental Management studies at Gondar University, Collage of Social Science and Humanities, Department of Geography and Environmental Management Studies.

Sponsor: - Self

Summarized purpose of the study: - As known, community based watershed development in rural areas of Ethiopia in five year growth and transformation plan on natural resource management and climate change(Fentahun, 2012). However watershed development has been problematic when applied in a rigid and conventional manner (Lakew et al, 2005). Therefore this study could be help full in contribution its part through generating clear understanding about challenges and opportunities for contribute to improve the livelihood of community or households through comprehensive and integrated natural resource.

The following questionnaires, therefore, present different questions related to these issues. Hence you are kindly requested to give your honest and fair answers to the questions. Your answers are crucial for the effectiveness of the research work and i assure you that the information you give will be confidential and only be used for the purpose of this research study.

I thank you and appreciate your willingness to participate in this research.

Part one: - Area Information

- Woreda:- _____, Kebele,_____, Climatic Zone: Kola/Waya dega/ dega (Underline one)

  Watershed Name: _____ Got, _____

Part Two: Household information

1. Sex of household head a) male b) female
2. Age of house hold head _____
3. Level of education of the house hold head
   a) illiterate b) read & write c) primary school d) secondary school
4. Marital Status a) single b) married c) divorce d) widowed
5. How many persons belong to your family including house hold head? _____
6. Farm experience (Number of years since started farming) of the household head_____
7. Size of land holding a) Own ___ ha b) rent : _____ ha
8. Average monthly income _____ birr
9. Average monthly expenditure: _____ birr
10. Access to credit a. available b. not available

Part Three: - Questions related to existing livelihood strategies and watershed management activities of communities

1. What are your major agricultural livelihood strategies? (Rank the major three)

No	House hold strategies	Responses(thick)
1	Farming own land	
2	Livestock rearing (dairy and fattening)	
3	Vegetable garden	
4	Share cropping other land	
5	Bee keeping	
6	Poultry	

Annexes

2. What are your major non- farm livelihood strategies? (Rank the major three)

No	House hold strategies	Responses(thick)
1	Support from parents /children, relatives / pension	
2	Selling fuel woods / grass/ charcoal	
3	Wage in anywhere /in urban/ piece job in kebele woreda.	
4	Hand craft/ local manufacture/	
5	Brewing / selling local beer /	
6	Traditional healing service	
7	Saving/ Credit in the cooperatives	
8	Renting out field	
9	Selling clothes/ house utensils/ Jewelers	
10	Governmental works	

3. What watershed management activities are continued sustainability and at what degree of extent? (Note:

1. Not at all
2. To some extent
3. Satisfactory
4. Strongly)

3.1. How soil and Water conservation activities are continued?

No	Types of Activities	Rank (Thick)			
		1	2	3	4
1	Soil bound				
2	Stone bund				
3	Planting on bunds				
4	Hill side terrace				
5	Cut of drain				
6	Micro basin construction				
7	Trench construction				
8	Gully rehabilitation				
9	Table terrace				

3.2. How forest development activities are continued?

No	Types of Activities	Rank (Thick)			
		1	2	3	4
1	Contract farmers nursery seeding production				
2	Forest enrichment planting				
3	Woodlot				
	Others if any				

Annexes

3.3. How crop production activities are continued?

No	Types of Activities	Rank (Thick)			
		1	2	3	4
1	Improved field crops (wheat, maize etc) production				
2	Improved horticulture (vegetables and fruits) production				
3	Improved fertilizers (DAP & UREA) use				
	Others if any				

3.4. How Livestock development activities are continued?

No	Types of Activities	Rank (Thick)			
		1	2	3	4
1	Artificial insemination service				
2	Improved breed supply including revolving system • Poultry,sheep,etc				
3	Improved bee keeping				
4	Improved forage/ grass, etc.				
	Others if any				

3.5. How community road construction and rehabilitation activities are continued?

No	Types of Activities	Rank (Thick)			
		1	2	3	4
1	Road construction and maintenance				
2	Bridge construction and maintenance				
	Others if any				

3.6. How drinking water supply activities are continued?

No	Types of Activities	Rank (Thick)			
		1	2	3	4
1	Spring water development				
2	Hand dug well development				
3	Spring water protection/ maintenance				
4	Hand dug well protection/ maintenance				
	Others if any				

3.7. How micro and small scale irrigation activities are continued?

No	Types of Activities	Rank (Thick)			
		1	2	3	4
1	Irrigation canal construction and maintenance				
2	Diversion weir maintenance				
3	Pedal pump use				
4	Irrigation structure grass planting				
	Others if any				

Annexes

3.8. How credit facilities continued? Are in cash or in kind credit facilities in your watershed?

a. Not at all b. to some extent c. Satisfactory d. strongly

3.9. How market facilities continued? Are market facilities suitable for watershed products?

a. Not at all b. To some extent c. Satisfactory d. strongly

Part four: - Questions related to main challenges of community based watershed development

4.1.Vulnerability context (shocks, trend stress, seasonality)

Could you please rank and then rate the following challenges as low medium, high in the watershed?

	Items	Extent		
		Low	Medium	High
Challenges	Low harvest			
	Natural resource degradation			
	Hunger / food crises			
	Unemployment			
	Epidemics human disease			
	Shortage of land			
	Drought/ erratic rain fall			
	Livestock disease			
	Depletion of water tables			
	Damage of roads			
	Low adoption of technology			
	Low involvement of institution			
	Crop pest			
	Unsuitable agricultural development policy			
	Low access of credit			
	Low livelihood improvement			
Opportunity	Existence of new technologies			
	Existence of new input (Seed, fertilizer)			
	Existence of fair crop price			
	Develop new watershed development knowledge			
	Develop new skill of watershed development			
	Existence of protection in human disease			
	Existence of protection in animal disease			
	Existence of protection in plant disease			
	High productivity and production			

Part five: questions related to opportunities of community based watershed development

5.1.Livelihood asset and capability

Physical assets (tools, and equipment's, technology etc.)

1. Do you access to new agricultural technology? a. Yes b. No

Annexes

2. If your answer for question number 1 is " Yes" list them

   _____

   _____

3. If your answer for Question number 1 is "NO" could you tell me the reasons?
   a. There is no new technology at all
   b. I don't have any information
   c. The cost is high and I don't have money
   d. I don't have sufficient land / farm
   e. Other if any specify

Economic and financial activities (Resource)

4. Farm land

Total Farm Land (Timad)	Rain fed land (Timad)		Irrigated land (Timad)	
	Outside the watershed	Inside the watershed	Outside the watershed	Inside the watershed

5. If you have an irrigated farm land in the watershed, what opportunity you gained?
   a. For crop diversification to risk minimize
   b. To increase income
   c. To improve productivity and production of the land
   d. To get nutritious food from horticultural crop
   e. Specify others.
6. What is the trend in your land holding size?
   a. Increasing b. Decreasing c. No change d. Other (specify) _____

7. If your answer for question no "6" is increasing, what are the reasons behind the increasing?

No	Response	Tick	Rank
1	Expansion in to forest area		
2	Land reallocation		
3	Cultivation of marginal land		
4	Rehabilitation of damaged lands		

8. If your answer to Question no "6" is decreasing, what are the root causes?

No	Response	Tick	Rank
1	Increases marginal land due to erosion		
2	Increases marginal land due to loss quality		
3	Land redistribution within the house hold		
4	Others		

9. What do you think is the trends of your crop production?
   a. Increased b. Decreased c. Remain the same

10. What are the major three constraints to crop production in the watershed?

No	Response	Yes/No
1	Erratic rain fall	
2	Labor Shortage	
3	Less access to input	
4	Drought	
5	Land Shortage	
6	Soil erosion	
7	Pest and disease	
8	Low and poor irrigation system	
9	Lack of finance	

11. Have you ever used improved crop varieties after the watershed intervention?
    a. Yes b. No
12. If your answer for question #"11" is "Yes" What are they?
    a. High yielding varieties of cereals crops (wheat, maize, teff etc.).
    b. High yielding varieties of pulse crops (peas, beans, and chickpea).
    c. High yielding varieties of vegetables.
    d. High yielding varieties of fruits.
    e. Others (Specify).
13. If your answer for question # "11" is "No" Why?
    A. Because I don't have farm land at all.
    B. Because I can't afford it.
    C. Because I don't have sufficient farm land.
    D. Because there is no improved variety.
    E. Because I suspect its productivity no change
    F. Because It demands extra managements
    G. Others
14. Have you used improved farm equipment in the watershed? a. Yes b. No
15. If your answer for Question # "14" is "Yes" What are they?
    a. Tridl pump
    b. Motor pump
    c. Pedal pump
    d. Tie – rigger
    e. Arm – strong
    f. Pannal
16. If your answer for Question # "14" is "No" Why? _____

17. Do you produce from your land enough to satisfy at least for your food need?
    a. Yes b. No C. More than enough
18. If your answer for Question number "17" is "No" how do you maintain your household food needed?
    a. Income from non- farm.
    b. Income from off – farm.
    c. Food aid (Cash aid).
    d. Renting the existing land for next cropping seasons.
    e. Migrating part of family to relative.
    f. Borrowing until next harvest.
    g. Others.
19. Do you have livestock? a. Yes b. No

20. What is the trend of livestock population?
    b. Increased b. Decreased c. Remain the same
21. If the answer for Question # "20" is decreased, what are the major three constraints?

No	Response	Yes/No	Rank
1	Livestock disease		
2	Natural disaster / drought		
3	Scarcity of fodder		
4	Lack of vet services		
5	The sector is not profitable		
6	Financial problems		

22. What is the trend of grazing land in the watershed?
    a. Increased b. Decreased c. Remain the same
23. If the answer for question # 22 is decreased, what are the major reasons?
    a. Contraction of farm land d. Out migration of farm households
    b. Deforestation
    c. Area enclosure e. Others specify
24. How do you manage the communal grazing land?
    a. Free grazing c. Agro forestry
    b. Develop pasture d. Cut and carry system e. others
25. Credit

No	Types of Credit	Sources of Credit	Purpose of Credit
1			
2			
3			
4			

26. What are your main sources of income? (the major three)
    a. Crop save
    b. Livestock
    c. Off farm income
    d. Non – farm Income
    e. Others (Specify)
27. Do non - agricultural incomes enable you to use existing watershed better?

    a. Yes b. No

Annexes

28. If you answer for question # 27 is yes what do you do?
    a. Environmental activities
    b. Economical activities
    c. Social activities
    d. Institutional activities
    e. Technical activities
    f. Trade and related
    g. Others ,if any
29. Does the watershed intervention production contribute to market and create incentive for the farmers? a. Yes b. No
30. Would you tell me about the natural resources in the watershed after interventions?
    a. Decreased b. increased c. Remain the same d. Others specify
31. What are you rating about access to financial /economic resources and their distribution for watershed development?
    (Note 1= Not at all, 2 = To some extent, 3= Satisfactory 4. Strongly)

No	Issues	Rating			
		1	2	3	4
1	Creates income generation activities to invest on watershed management				
2	Creates local rules/ institutions to protect and manage natural resources in the watershed				
3	Create employment opportunity				
4	Reduce conflicts over contest of NRs				
5	Enabled me better utilization of grass and forest resources				
6	Enabled me to harvest water and use irrigation				
7	Enabled me to access and own farm land				
8	Create businesses/ entrepreneurship and reduce dependency on NRs				
9	Protect soil erosion and resource damage by planting trees.				
10	Enabled me not to deforest				
11	Enabled me to food secure				

Human resources knowledge, skill and capacity

32. Training (major four)

No	Types	Knowledge gained	Skill	Purpose of Training
1				
2				
3				
4				

33. What are the sources of new technologies?
    a. Government Developmental agent b. Neighbors c. NGOs d. Media (Radio)

Social Capital/ asset resources

34. Did you recognized as member of the watershed communities? a. Yes b. No
35. Do you have relatives or friends help you in Cash? a. Yes b. No

Annexes

36. If you answer for question # "35"is yes, what do you do by that cash?

a. Land improvement
b. Soil and water conservation
c. Input supply for crop production
d. Livestock and forage development
e. Others

Arable land and natural resources

37. How do you perceive the trend in natural resource degradation in your watershed?

a. Worsening b. Remain the same c. Increasing

38. What are the major forms of land degradation before and after the watershed intervention?

(The major three)

No	Responses	Before		After	
		Yes	No	Yes	No
1	Soil erosion by water				
2	Deforestation				
3	Overgrazing				
4	Range land degradation				
5	Forest degradation				
6	Lowering of water table				
7	Soil fertility Decline				

39. What are the actual response and communal benefits that you have got from the interventions? (The major three)

No	Responses	Household (yes/no)	Community (yes/no)
1	Increased crop production		
2	Increased access to livestock feed		
3	Reduce soil erosion from own farm		
4	Better access to potable water		
5	Increased irrigation water		
6	Satisfied demand for fuel wood and construction material		
7	Other specify		

Mediating factors (Related to participation)

40. Did you participate in watershed development / management?

a. Yes b. No

41. If "yes" in which part you participate?

No	Issues	Yes	No
1	Pre- planning discussion of the watershed.		
2	During planning of the watershed.		
3	During implementing of the activities in the watershed.		
4	Monitoring and evaluation of activities.		

Annexes

42. Are you still taking part in the watershed? a. Yes b. No

43. Do you like to extend your participation in watershed management? a. Yes b. No

44. If your response for question # 42 "Yes" why?_____

45. If your response for question # 43 "Yes" Why? _____

46. Who are the major stakeholders involves in the watershed intervention?

a. Government b. NGOs (Specify) 3. Others (specify)

47. Does government perform what expected from it? a. Yes b. No

48. Does the involved NGO's perform what is expected from them? a. Yes b. No

Part six: Questions related to impacts of community based watershed development for sustainable livelihood (Ecological, Economical and social impacts).

6.1. Ecological impact responses /gains.

1. Do you believe that soil, water and vegetation resources are conserved and rehabilitated as the result of CBWSD in your watershed area?
   a. No
   b. Yes, to some extent.
   c. Yes, satisfactory.
   d. Yes, strongly.
2. Do you observe increasing overall vegetation cover (grass and woody biomass) over time?
   a) No
   b) Yes, to some extent.
   c) Yes, satisfactory.
   d) Yes, strongly.
3. Are you observing improvement on regeneration of springs and strengthen of weaker base flows?
   a) No
   b) Yes, to some extent.
   c) Yes, satisfactory.
   d) Yes, strongly.
4. Are you observing improvement on the soil fertility of cultivated lands?
   a) No
   b) Yes, to some extent.
   c) Yes, satisfactory.
   d) Yes, strongly.
5. Are rehabilitated gullies well stabled and vegetated?
   a) No
   b) Yes, to some extent.
   c) Yes, satisfactory.
   d) Yes, strongly.

6.2. Economic impact Responses/ gains.

1. Is your field crops production increased as a result of watershed development?
   a) No
   b) Yes, increased by some amount.
   c) Yes, increased by two folds or more.
2. Is your vegetables and fruit productions increased as a result of watershed development?
   a. No
   b. Yes, increased by some amount.
   c. Yes, increased by two folds or more.
3. Is your cattle, Sheep & poultry production increased as a result of watershed development?
   a. No
   b. Yes, increased by some a mount
   c. Yes, increased by two folds or more
4. Is your honey production increased as a result of watershed development?
   a) No
   b) Yes, increased by some amount.
   c) Yes, increased by two folds or more.
5. Is there any increase in the availabilities of forest products (Wood for fuel, construction, farm tools, fences etc.) following the implementation CBWSD in the watershed?
   a. No
   b. Yes, increased by some amount.
   c. Yes, increased by two folds or more
6. Is additional income generated from the sale and use of grass from gullies, closed area, etc?
   a) No
   b) Yes, increased by some amount.
   c) Yes, increased by two folds or more.
7. Is additional income generated from the use of revolving funds introduced by the watershed development program?
   a. No
   b. Yes, increased by some amount.
   c. Yes, increased by two folds or more.

6.3. Social Impact Responses / gains.

1. Do you believe watershed users association play important role to mobilize the community to continue the watershed management activities in watershed areas?
   a) No
   b) Yes, to some extent.
   c) Yes, satisfactory.
   d) Yes, strongly.

2. Do you believe you access to social services (education, health, Family planning etc) improved as compared to the situation before CBWSD program?
    a) No
    b) Yes, to some extent.
    c) Yes, satisfactory.
    d) Yes, strongly.
3. Are the involvement of women and other vulnerable groups in the watershed development program improving over time?
    a) No
    b) Yes, to some extent.
    c) Yes, satisfactory.
    d) Yes, strongly.
4. Are there specific activities that address women's interest or needs?
    a) No
    b) Yes, to some extent.
    c) Yes, satisfactory.
    d) Yes, strongly.
5. Is there high motivation and action to adapt or use new technologies and practices?
    a) No
    b) Yes, to some extent.
    c) Yes, satisfactory.
    d) Yes, strongly.
6. Are communities build confidences in approaching fund supporting agencies and technical support providers?
    a) No
    b) Yes, to some extent.
    c) Yes, satisfactory.
    d) Yes, strongly.
7. Is there motivation and investment on development of communal resources such as road, bridge, irrigation structures, water points and closed areas?
    a) No
    b) Yes, to some extent.
    c) Yes satisfactory.
    d) Yes, strongly.

Annex-III. Checklist for Focused Group discussion.

Target: All CBOs committee members

Session: one group at once

1. CBOs information
   1.1. Address; Woreda: _____ Kebele :_____ Got:_____
   Climatic Zone: _____
   1.2. CBOs name
      a. Watershed users association
      b. Watershed committee team
   1.3. Name of watershed: _____
   1.4. Identification number : _____
   1.5. Number of CBOs committee member _____
   1.6. Date of establishment (day/month/ year in E.C): _____
2. Livelihood strategies and watershed management activity issues
   2.1.What are major agricultural livelihood strategies? (Rank the major three)
   2.2.What are major non – agricultural livelihood strategies? (Rank the major three)
   2.3.What watershed management activates continued sustainably and at what degree of extent?
   2.4.For practices continued satisfactory and above what factors, do you believe, are contributing to continue the practices?
   2.5.For practices not continued, what factors, do you believe, are contributing to continue the practices?
3. Challenges: what are the challenges of community based watershed development from sustainable livelihood perspective?
   3.1.Economically
   - What are the crop productivity and productivity and production challenges?
   - What are the challenges to expand irrigation?
   - What are the livestock production challenges?
   - What are the landless households' challenges in the watershed?

3.2.Socially

- What are the relationship challenges in the watershed?
- What are the network challenges in the watershed?
- What are the norms and beliefs obstacles for sustainable livelihood in the watershed?
- What are the gender issue challenges in the watershed?

3.3.Environmentally

- What are the challenges of soil and water conservation practices?
- What are the constraint of land degradation and soil erosion?
- What are the degradation features of watershed management's challenges?

3.4.Institutionally

- What are the formal institute challenges to involve?
- What are the challenges of NRs policy in the watershed?
- What are the challenges of land policy in the watersheds for soil and water conservation?
- What are the challenges of informal institutions (Idir, mahber, senbete and etc) in the watersheds?

3.5.Technically

- What are the challenges of technical activities in the planning?
- What are the challenges of technical activities in monitoring and evaluations?

3.6.Physically

- What are the challenges of soil and water conservation in the watershed?
- What are the challenges of water harvesting structures in the watershed?
- What are the challenges of other physical asset in the watershed?

3.7.Technologically

- What are the main challenges for technology adoption in the watershed?
- What are the major obstacles to introduce technologies in the watershed?

4. Opportunities, what are the opportunities which lead community based watershed development to enhance sustainable livelihood?

4.1.Economically

- What are the economic opportunities of crop production in the watershed?
- What are the economic opportunities of livestock production in the watershed?

- What are the economic opportunities of poultry and bee keeping in the watershed?
- What are the economic opportunities over all?
- What are irrigation contributions for sustainable livelihoods in the watershed?

4.2. Socially

- What are the potential opportunities of social (alleviation of poverty, awareness generation, improving skills of the local community, capacity building, women's participation in decision making process, empowerment of community)?
- What are the potential use of relationships, networking and norms in the watershed?

4.3.Environmentally

- What are the potential uses of enviromental's land management in the watershed for sustainable livelihood?

4.4.Institutionally

- What are the institutions created due to the intervention of watershed programs?
- What are the opportunities of institutions towards CBWSD

4.5.Technically

- What is the technical knowledge of skills created to support the farms in the watershed?
- What is the opportunity of knowledge of skills towards CBWSD?

4.6.Physically

- What types of physical assets created due to the watershed intervention?
- What are the opportunities of assets (physically) in the CBWSD towards sustainable livelihoods?

4.7.Technologically

- What types of technologies adopt due to watershed intervention?
- What opportunities gained from technologies towards sustainable livelihoods?

5. Issues related to impacts of CBWSD for sustainable livelihood (Ecological, social and Economical).

5.1.Ecological impact gains

- Do you believe soil, water and vegetation resources are conserved and rehabilitated as the result of CBWSD in your watershed area?
- Do you observe increasing overall vegetation cover (grass and woody biomass over times?

Annexes

- Are you observing improvement on regeneration of springs and strengthening of weaker base flow?
- Are you observing improvement on the soil fertility of cultivated lands.
- Are rehabilitated gullies well stabilized and vegetated?
- Is food damage on downstream areas reduced due to the watershed treatment?

5.2.Economic impact gains

- Are field crops production increased as a result of CBWSD?
- Are vegetables and fruits production increased as a result of CBWSD?
- Are cattle, sheep and poultry production increased as a result of CBWSD?
- Is there any increase in the availability of forest products (wood for fuel, construction, farm tools, fences, etc) following the implementation of CBWSD?
- Is additional income generated from the sale and use of grass from gullies, closed areas, etc.?
- Are there increased availabilities of water for irrigation, drinking and sanitation in your watershed as a result of integrated watershed management practices?
- Is additional income generated from the use of revolving founds introduced by CBWSD project?

5.3. **Social impact gains**

- Do you believe CBOs play important role to mobilize the watershed management activities?
- Do you believe your access to social service (education, health, family planning, etc) improved as compared to the situation before?
- Are the involvement of women's and other vulnerable groups in the watershed development program improving over time?
- Are there specific activities that address women's interest or needs?
- Is there high motivation and action to adopt or use new technologies and practices?
- Are communities build confidences in approaching fund supporting agencies and technical support providers?
- Is there motivation and investment on development of communal resources such as road, bridge, irrigation structures, water points and closed areas?

List of CBOs for focus group Discussion (FGD)

Location	Types of participants	CBO name
Gondar Zuria Woreda (Aba Gollem Woreda)	Committee members _____	Watershed users association
Lay armachiho Woreda (Sommi Watershed).	Committee members _____	Watershed users Association

Thank you!!

Annexes

Annex. IV. Structured and Semi Structured Interview for Key Informants

Name_____
Educational status_____
Location of work_____
Position/responsibility_____
How long have you worked at this post? _____

Checklists to Guide Key Informant Interview with Woreda Agricultural and Rural Development Office and project focal persons.

1. Existing livelihood strategies and watershed management activity issues:

1.1. What are the major agricultural and non-agricultural livelihood strategies?
1.2. How do you relate the livelihood strategies with NRM and utilization?
1.3. What watershed management activities continued sustainably and at what degree of extent? Can you explain based component by component?
1.4. For practices continued satisfactorily and above what factors, do you believe, are contributing to continue the Practices?
1.5. For practices not continued, what factors, do you believe, are contributing to affect the continuity of the Practices?

2. *Issues on challenges and opportunities:*
2.1. What are technical and technological challenges and opportunities in the watershed?
2.2. What are socio-economic challenges and opportunities in the watershed?
2.3. Is there common pool natural resources? How is it managed by the Woreda offices?
2.4. Are there institutions, Rules, Regulations/Sanctions on resource use, NRM?
2.5. Do you think that NR is used in sustainable manner in the watershed?
2.6. What are the activities that the government performs?
2.7. What are the activities that the NGO perform?
2.8. What are the activities that the government did not perform?
2.9. What are the activities that the NGO did not perform?

3. Gains/responses related to impacts of CBWSD on Ecological, Economical and Social

Ecological responses

- Do you believe soil, water and vegetation resources are conserved and rehabilitated as the result of CBWSD in your watershed area?
- Do you observe increasing overall vegetation cover (grass and woody biomass) over time?
- Are you observing improvement on regeneration of springs and strengthening of weaker base flows?
- Are you observing improvement on the soil fertility of cultivated lands?
- Are rehabilitated gullies well stabilized and vegetated?
- Is flood damage on downstream areas reduced due to the watershed treatment?

Economic Responses

- Are field crops production increased as a result of integrated watershed development?
- Are vegetables and fruits production increased as a result of watershed development?
- Are cattle, sheep & poultry production increased as a result of watershed development?

- Is your honey production increased as a result of watershed development?
- Is there any increase in the availability of forest products (wood for fuel, construction, farm tools, fence, etc.) following the implementation of CBWSD in the watershed?
- Is additional income generated from the sale and use of grass from gullies, closed areas, etc.?
- Is there increased availability of water for irrigation, drinking and sanitation in your watershed as a result of community based watershed development practices?
- Is additional income generated from the use of revolving funds introduced by the watershed development program?
- Are additional employment opportunities created for landless youth in the watershed following the implementation of CBWSD?

Social Responses/gains

- Do you believe CBOs play important role to mobilize you to continue the watershed management activities?
- Do you believe your access to social services (education, health, Family planning, etc.) improved as compared to the situation before the program?
- Are the involvement of women's and other vulnerable groups in the watershed development program improving over time?
- Are there specific activities that address women's interest or needs?
- Is there high motivation and action to adapt or use new technologies and practices?
- Are communities build confidences in approaching fund supporting agencies and technical support providers?
- Is there motivation and investment on development of communal resources such as road, bridge, irrigation structures, water points and closed areas?

Checklists to Guide Key Informant Interview with watershed committee chairpersons

- What are technical and technological challenges and opportunities in the watershed?
- What are socio-economic challenges and opportunities in the watershed?
- What do you think the dominant livelihood strategies of the land scarce farmers?
- What is the status and trends of natural resources (forestland, water bodies, arable land, wildlife. etc.), possible cause of NR degradations, efforts made to manage, and threats for sustainable NRM…..?
- Is there common pool natural resources? How is it managed by community?
- Are there institutions, Rules, Regulations/Sanctions on resource use, NRM?
- Do you think that the land scarce farmers could get land from KA/ any other options?
- How these farmers are assisted to lead a better life?
- What are the activities that the government performs?
- What are the activities that the NGO perform?
- What are the activities that the government did not perform?
- What are the activities that the NGO did not perform?

Checklists to Guide Key Informant Interview with Local Elders

- What are technical and technological challenges and opportunities in the watershed?
- What are socio-economic challenges and opportunities in the watershed?
- What Status and trends of natural resources?
- What access to and control (land owner, landless, poor, women, and youth) over natural resource utilization?
- Who engaged (land owner, landless, poor, women, and youth) in non-agricultural income earning? Why?
- Do you inherit or give farmlands to your children/ grand children? Why not? Why so?
- What are the activities that the government performs?
- What are the activities that the NGO perform?
- What are the activities that the government did not perform?
- What are the activities that the NGO did not perform?

Checklists to Guide Key Informant Interview with Women and Children Affair Offices

- Do women access to key livelihood resources as equal as men? Why? How?
- How do land scarce or landless women are supported?
- Do women equally access to natural resources? Why?
- Who control (female, male) the income from non-agricultural activities in the HH? Why?
- Who control (female, male) the income from agricultural activities in the HH? Why?
- Who engage (female, male, youth) in non-agricultural activities mostly? Why?
- Do the livelihood strategies enhance NRMs or haste natural resource degradations?
- Is there trade-off or synergy between the livelihood strategies and women's domestic activities?
- Do the livelihood strategies add burden to women or reduce it?
- Does it allow women to have their own income sources? Does it allow women to engage in productive (income generating) activities?

List of persons for key informant Interview

Location	Position	Name
Lay armachiho Woreda	Watershed Development agent	Lewam haile
	Watershed Committee chair person	Moges Adugna
	Women and children affair agent	Sintayehu Tsegaye
Gondar zuriya Woreda	Watershed Development agent	Solomon teka
	Watershed Committee chair person	Gashaw setegn
	Women and children affair agent	Workenash mazengea
Gonder	Project focal person	Zelalem bereket

Thank you!!

Annexes

Annex .V. Checklists for observation and photograph.

(Data directly to be taken from observation and photograph by the researcher)

No	Issues	Rating		
		VG	G	P
1	Biophysical condition.	✓		
2	Soil and water conservation works.	✓		
3	Forest development \vegetation cover.	✓		
4	Micro and small scale irrigation.		✓	

Quality description

Very Good (VG):

- When all what have been achieved are in a very good State. (E.g. A gulley is well rehabilitated, check dams or gabion are in good State, vegetation is dense and well protected, and almost all parts of the gulley are well covered by grass and woody biomass)

Good (G):

- All what have been achieved are in good States with some additional maintenance or plantation works needed to make them perfect. Damages could be partly from design, lack of proper protection or some climatic factors such as extreme flood or drought. (E.g. A gulley is rehabilitated well (good quality structures, well-shaped and planted with appropriate vegetative materials) but some plants are dried or destroyed by animals or due to slight neglect, some of the check dams or Gabion need maintenance, etc.)

Poor (P):

- The major parts of what have been achieved are destroyed or are in bad shape or are not functional or are in poor standard (eg.1: A gulley is not rehabilitated well, most check dams are destroyed either by animals or because of poor design and quality, most of planted materials are either dried or destroyed by animals or human intervention or lack of follow-up or shortage of key resources such as water or design failure; eg.2: A pond that is cracked and is without water, or most of the installations (such as pumps, pipes, etc.) are malfunctioning, etc.)

Thank you!!